425

425 Maintenance Manual OSCILLOSCOPE

DUMONT

ALLEN B. DU MONT LABORATORIES, INC., CLIFTON, NEW JERSEY, U. S. A.

TYPE 425 Maintenance Manual OSCILLOSCOPE

DU MONT

Serial No. _____

ELECTRONIC TUBES • ELECTRONIC INSTRUMENTATION • INDUSTRIAL TELEVISION • MILITARY ELECTRONICS • AUTOMOTIVE TEST EQUIPMENT • TWO WAY RADIO

ALLEN B. DU MONT LABORATORIES, INC., CLIFTON, NEW JERSEY, U. S. A.

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ALLEN B. DU MONT LABORATORIES, INC.
Industrial Electronics Division
Clifton, N. J.
U. S. A.

Part Number 6703 8301

PRINTED IN U.S.A.

Printing Produced by
The George R. Epple Co.
Somerville, N. J.

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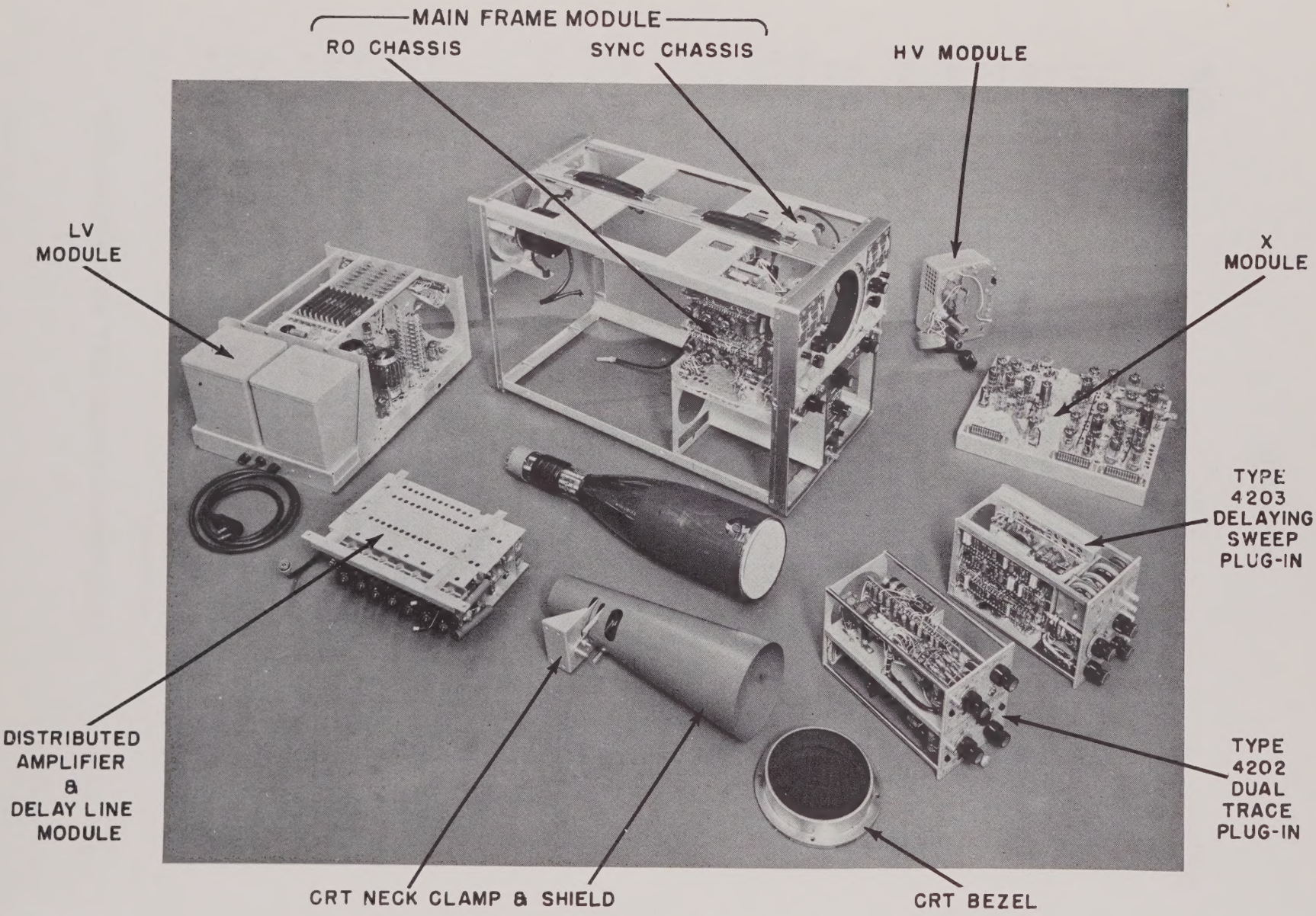


FIGURE 1-1. ILLUSTRATING THE MODULE MAKE-UP OF TYPE 425 OSCILLOSCOPE

SECTION 1

MAINTENANCE

1-1. INTRODUCTION

This Maintenance Manual contains Service Information, Procedures for Internal Adjustments, Schematics, and Parts List for the Type 420 Series Oscilloscopes. The Operating Manual for these series is a separate book and it contains information on Specifications, Operating Instructions, and Applications. The Operating and Maintenance Instructions for the Plug-in Units will be found in a single manual for the respective unit.

WARNING

OBSERVE THE FOLLOWING PRECAUTIONS WHEN NECESSARY TO ENERGIZE THE EQUIPMENT WITH THE PANELS REMOVED

1) Never work alone.
2) Make sure the chassis is properly grounded.
3) Remove power cord before changing any tubes.
4) Before touching any components, short the terminals to remove any possible charge that may remain after turning off the power.

1-2. PREVENTIVE MAINTENANCE

a. AIR FILTER

The Type 420 Series Oscilloscopes are cooled by air drawn into the instruments through a washable filter constructed of rubberized dynel fiber. If the filter becomes dirty, it will restrict the flow of air and may cause the instrument to overheat. You should inspect and clean the filter every three or four months. Should the thermal relay in the instrument open up, the filter should be checked immediately. To clean the filter, first remove loose dirt from the filter by rapping it

gently on a hard surface. Then wash the filter briskly with warm water. The filter may be left in the side cover while flushing.

b. FAN MOTOR

Fan motor bearings should be lubricated every three or four months with a few drops of light machine oil. Failure to lubricate the bearings periodically will injure the fan and thereby cause instrument overheating.

c. VISUAL INSPECTION

You should visually inspect the entire Oscilloscope every few months for possible circuit defects. These defects may include such things as loose or broken connections, damaged binding posts, improperly seated tubes, scorched wires or resistors, missing tube shields, or broken terminal strips. For most visual troubles the remedy is apparent; however, particular care must be taken when heat-damaged components are detected. Overheating of components is often the consequence of other, less obvious defects in the circuit. It is essential that you determine the cause of overheating before replacing heat-damaged components in order to prevent further damage. The Type 420 Series Oscilloscopes are stable instruments that will provide many hours of trouble-free operation. However, to insure the reliability of measurements, we suggest that you recalibrate the instruments after each 500 hours of operation (or every six months if used intermittently). Complete recalibration procedures are given in this Maintenance Manual.

1-3. GAINING ACCESS TO THE CHASSIS

The panels of this instrument are held in place by spring-loaded screwhead fasteners. To remove the side panels, use a screwdriver to rotate the fasteners approximately a half-turn counterclockwise; then pull the upper portion of the panels outward from the carrying handles. This will expose most of the tubes and service adjustments for normal maintenance. To remove the bottom panel, lay the instrument on its side, remove the screws and pull of the panel. Panels are replaced by reversing the order of their removal.

1-4. CATHODE-RAY TUBE REPLACEMENT

> **CAUTION**
>
> THE CATHODE-RAY TUBE SHOULD BE HANDLED WITH CARE TO PREVENT BREAKAGE AND/OR SERIOUS PERSONAL INJURY FROM FLYING GLASS. DO NOT EMPLOY FORCE AT ANY TIME. AS AN ADDED PRECAUTION, IT IS ADVISABLE TO WEAR SAFETY GOGGLES AND GLOVES.

The following step-by-step procedure is suggested for replacing the cathode-ray tube:

1) Turn off the power and remove the side panels.

2) Remove bezel held by four screws at front panel.

3) Remove the cathode-ray tube socket and the intensifier button.

4) Remove the four deflection-plate leads located at the neck of the tube.

5) Loosen the two clamp screws at the neck of the cathode-ray tube.

6) Pull the cathode-ray tube straight out through the front panel.

7) Carefully exchange the rubber clamp strip from the old to the new cathode-ray tube.

8) Install new tube through front-panel opening, and replace the bezel.

9) Replace the tube socket, deflection-plate connectors, and the intensity button.

10) Apply power and check the sweep; if not horizontal, loosen the clamp-handle screw and rotate the tube as required.

11) Tighten the cathode-ray tube neck-clamp screws and the clamp-handle screw securely to prevent rotation of the tube.

1-5. ILLUMINATED SCALE LAMP REPLACEMENT

Defective scale lamps are removed as follows:

1. Turn off power and remove side panels.

2. Remove the cathode-ray tube as described in an earlier paragraph.

3. Remove the appropriate lamp assembly located on the rear side of the front panel by depressing the spring clip. The defective bulb may then be removed and replaced.

NOTE: The scale lamps are connected in series-parallel. One defective lamp will cause two to be out at the same time. Refer to the Schematic entitled, "Display Logic Switch and Scale Lamps" for the connection detail.

1-6. SERVICING HINTS

This is a complex electronic instrument. There is no simple way of locating troubles. An understanding of the functions of the circuits is the best help. With an understanding of the circuits, you will be able to make a reasonable assumption at the general source of troubles from their symptoms.

To keep electronic units operating at top performance, it is desirable to check the equipment at regular intervals. How often it is checked, will depend on the installation and the conditions of operation. In general, portable units moved about constantly will require more frequent service than units fastened down permanently.

For these regular checks, clean all dust and dirt from the unit, using a light air blast or soft brush. Be sure that the dust is removed from around tube socket contacts and terminal strip connections.

In the event of improper equipment performance, the following suggestions are recommended:

1) Note that all tube heaters are lit, or feel tubes for warmth.

2) If the instrument fails to operate at all, including the fan

and the pilot light, check the source of power and determine that the power cord is firmly in place. Then check the fuses at the rear of the instrument. If the instrument has been operating but has just stopped and the fan is still working, it may have overheated and tripped the thermal cutout switch. The thermal cutout switch will reset itself when the interior temperature of the instrument drops to a safe value. Possible causes of overheating are: restriction of air circulation, high room temperature, or the instrument may have been operating over an extended period with the side panels removed. Be sure that the air filters are clean.

3) If the fan and pilot light operate, but there is no spot visible, there is a possibility that the spot is positioned off the screen. Check whether the beam-position-indicator lamps are operating and if the PATTERN POSITIONING control or the Y Plug-in POSITION control produce any effect. Advance the INTENSITY control and see if there is some unfocused glow on the screen to indicate operation of the CRT circuitry.

4) Localizing the trouble is made easier by use of an oscilloscope to check waveforms. Use a high-impedance Probe while trouble shooting.

5) Replacement of certain tubes may require resetting of one or more service adjustments. Consult Table 1-1. For optimum stability, the new tube should be allowed a warmup time of at least 10 minutes before making any service adjustments.

6) Maintain a high quality of workmanship. Use a clean bench and soldering iron; keep solder joints smooth and bright; do not overheat any component while soldering. Use heat sinks while soldering semiconductors.

7) When using accessory probes or adapters, be sure the trouble is not originating in the accessory, before suspecting the oscilloscope itself.

8) Troubles are usually caused by tube failure and one way to locate defective tubes, is to try replacing them

with good ones. Sometimes the aftermath of tube failure yields charred resistors or over-stresses capacitors. Obviously in these cases you will also have to find and replace the damaged components, which can be found by visual inspection. If possible, replace all suspected tubes at one time, and if the trouble is helped, return the old tubes one-at-a-time until the offending one is discovered.

9) When more than one Type 420 Series Oscilloscope is available, the subchassis may be interchanged to isolate the troubled area, thus expediting maintenance.

1-7. REPLACEMENT PARTS

a. STANDARD PARTS

Replacement for all parts used in Type 420 Series Oscilloscopes can be purchased directly from Du Mont. However, since most of the components are standard electronic parts, they can generally be obtained locally in less time than is required to obtain them from the factory.

If it is necessary to order a replacement component from the factory, always give the Type number and Serial number of the instrument. Before ordering parts for in-warranty replacement or purchasing them for out-of-warranty replacement, be sure to consult the Parts List in this Manual. The Parts List gives the values, tolerances, ratings, and Du Mont part number for all electrical components used in the instrument. This will help to expedite service.

b. SPECIAL PARTS

In addition to the standard electronic components mentioned in the previous paragraph, some special parts are also used in the assembly of the Type 420 Series Oscilloscopes. These parts, such as delay lines, special resistor values, transformers, etc., are manufactured specially for Du Mont by other companies in accordance with Du Mont specifications. These parts and most mechanical parts should be ordered directly from Du Mont since they are normally difficult or impossible to obtain from other sources. All parts may be obtained either directly from the factory or through the local Du Mont representative.

Since the production of this instrument, some of the parts may have been superseded by improved components. In such cases, the part numbers of these new components will not be listed in your Parts List. However, if you order a part from Du Mont, and it has been superseded by an improved component, the new part will be shipped in place of the part ordered. Your local Du Mont representative has knowledge of these changes and may call you if a change in your purchase order is necessary.

1-8. LOCATIONS OF TUBES, SERVICE ADJUSTMENTS, AND TEST POINTS

The location of tubes, service adjustments, and test points are shown on the appropriate schematic drawings which will be found in the last section of this Manual.

Normally, it will not be necessary to make all of the adjustments in the paragraphs to follow. However, any adjustment that is made, should be accomplished in the indicated sequence.

> WARNING
>
> WHEN THE PANELS ARE REMOVED FROM THE INSTRUMENT FOR SERVICING, EXERCISE CAUTION WHILE THE POWER IS ON. The lower-voltage busses are potentially more dangerous than the cathode-ray tube potential because of the high-current capabilities and large filter capacitors employed in these supplies. When you reach into the instrument with one hand while it is turned on, do not grasp the metal frame with the other hand. If possible, stand on an insulated floor and use insulated tools. It is advisable to ground the third lead in the power cord whenever the instrument is in use.

1-9. EQUIPMENT REQUIRED FOR ADJUSTMENTS AND TROUBLE SHOOTING

DESCRIPTION	CHARACTERISTICS
Volt-ohmmeter	Simpson Model 260 or equivalent; 20,000 ohms/volt sensitivity
Digital Voltmeter	John Fluke Model 800; incremental accuracy of 0.5% or better
Square Wave Generator	Tektronix Type 105 or equivalent
Autotransformer	Powerstat, Variac, or equivalent; capable of varying line voltage of the instrument being calibrated from 105 volts to 125 volts
Oscilloscope	Du Mont Type 425 and Type 403B Oscilloscopes, or equivalent
Du Mont Type 4207	Y Test Plug-in Unit used for normalizing the gain of the vertical channels
Insulated Alignment Tool	General Cement Co., Type 8271, or equivalent
Resistor (Qty 3)	Fixed, composition, 91 megohms, ±20%, 1/2 watt; Du Mont Part Number: 0204 2300
Resistor (Qty 2)	Fixed, film, 61.9K ohms, ± 1%, 1/2 watt; Du Mont Part Number: 0239 0342
Resistor (Qty 1)	Fixed, film, 100K ohms, ± 1%, 1/2 watt; Du Mont Part Number: 0239 0346
Resistor (Qty 1)	Fixed, film, 2 megohms, ± 1%, 1/2 watt; Du Mont Part Number: 0229 6140

1-10. CHECKING POWER SUPPLY VOLTAGES

Preset the Main Frame front-panel controls as follows:

Control	Setting
TRIGGER MODE	NORMAL AC
STABILITY	PRESET
DISPLAY LOGIC	MAIN SWP
LENGTH	X1
SWEEP RATE	5 MS/CM
VERNIER	Pushed in
TRIGGER SOURCE	OFF
TRIG LEVEL	Center of Range

Check to see that the time base has not been initiated. Allow 20 minutes for warmup before making any adjustments.

The following voltages in the Low Voltage Power Supply should be checked and readjusted if necessary. Use a John Fluke Model 800 or equivalent Digital Voltmeter with an incremental accuracy of ±0.5% or better.

Test Point	Voltage and Tolerance	Service Adjustment	Location
TP2103	-150V ±0V	-150V ADJ (R2169R)	All adjustments are located on the Low-voltage Module, Schematic 8901 4711-4
TP2102	+110V ±0V	+110V ADJ (R2169F)	
TP2101	+255V ±0V	+255V ADJ (R3106F)	
TP2100	+420 +3V, -6V	No Adjustment	

NOTE: All adjustments should be made at mid-line voltage: 115V/230V, ±2%

1-11. SWEEP-CIRCUIT ADJUSTMENTS

a. CLAMP ADJ (R5222F, X Module Schematic 8901 4731-4)

The CLAMP ADJ controls the screen voltage of the Saw Generator Clamp Tube V509 which is adjusted for nominal zero bias tube current.

1. Set a Simpson Model 260 Multimeter to 100 MICRO-AMPS. (This is equivalent to 0.25 volt full scale.)

2. Connect this meter across R5227 by connecting the positive lead to TP5200 and the negative lead to TP5201. See Sheet 4 of the Schematic listed in the heading.

3. Adjust the CLAMP ADJ for an indicated reading of 0.1 volt.

b. SAW START LEVEL (R5222R, X Module Schematic 8901 4731-4)

The SAW START LEVEL provides adjustment of the dc starting level of the Main Sweep so that it may coincide with the starting point of the Delaying Sweep.

1. Connect a vacuum-tube voltmeter from pin 6 (positive) of the Saw Bootstrap Cathode Follower, V510, to ground.

2. Adjust the SAW START LEVEL for an indicated reading of 33 volts.

3. This adjustment must later be retouched to normalize the starting point of the Main and Delaying Sweeps.

c. SWEEP MODE PRESET (R6167, Main Frame Module, Schematic 8901 4741-4)

The SWEEP MODE PRESET adjustment sets the optimum point for triggering when the STABILITY control is set to PRESET.

1. On the Main Frame set TRIGGER SOURCE switch to OFF, TRIGGER MODE switch to NORMAL AC, and STABILITY control to PRESET.

2. Temporarily, connect a 2-megohm 1% resistor from the arm of the SWEEP MODE PRESET adjustment to ground. This point is readily available at pins 12 and 13 (on outside - count from left to right) of bottom Assembly Board on Sync Chassis.

3. Adjust the SWEEP MODE PRESET until a trace just appears on the screen (driven sweep).

4. Disconnect the 2-megohm resistor. The trace should now disappear.

1-12. TRIGGER CIRCUIT ADJUSTMENTS

a. TRIG SENS (R6139, Main Frame Module Schematic 8901 4741-4)

The TRIG SENS adjustment is provided in the Sync Shaper Trigger circuit to set the current of the normally conducting tube and the backlash voltage.

1. On the Main Frame, set TRIGGER SOURCE switch to OFF and rotate TRIG LEVEL control in a direction fully opposite from PRESET. The SYNC READY lamp should be on.

2. Connect a Simpson Model 260 or equivalent voltmeter across the cathode resistor R6148 in the Sync Shaper circuit, V613 and V614, pin 6 (positive). R6148 is located on the Assembly board just below the TRIG LEVEL CENT (R6125) adjustment.

3. Set TRIG SENS adjustment for an indicated reading of 2.6 volts

4. Slowly rotate the TRIG LEVEL control. When this control is rotated about one-half way, the voltage should change abruptly from 2.6 volts to approximately 0.9 volt. At this point the SYNC READY lamp should be extinguished.

5. Reset the TRIG LEVEL control to PRESET.

b. TRIG LEVEL CENT (R6125, Main Frame Module Schematic 8901 4741-4)

The TRIG LEVEL CENT adjustment sets the level of the Trigger Shaper circuit so that no readjustment of the TRIG LEVEL control is required when the TRIGGER SOURCE switch is set from plus to minus slopes or vice versa.

1. On the Main Frame, set TRIGGER MODE to NORMAL AC, TRIG LEVEL to PRESET, and TRIGGER SOURCE to OFF.

2. Adjust TRIG LEVEL CENT until the SYNC READY Lamp is "just on". Next, advance this adjustment slightly beyond the threshold level of "just on" for the final setting.

c. AUTO SYNC ADJ (R6153, Main Frame Module Schematic 8901 4741-4)

The AUTO SYNC ADJ is provided to optimize the slope of the regenerative loop of the Sync Shaper circuit in order to improve triggering ability.

1. Set TRIGGER MODE to AUTO (SLOW or FAST), TRIGGER SOURCE to OFF, and TRIG LEVEL to PRESET.

2. Connect a 273-megohm resistor from pin 2 of the Sync Buffer Cathode Follower V612A to ground. (The 273-megohm resistor is comprised of three 91-megohm resistors connected in series.)

3. Set AUTO SYNC ADJ for intermittent or threshold operation of the Main Sweep.

4. Remove the resistor. A horizontal reference trace should appear on the screen only when the TRIGGER SOURCE switch is set to AUTO (SLOW or FAST).

1-13. CATHODE-RAY TUBE ADJUSTMENTS

a. -1200V ADJ (R1000, HV Module Schematic 8901 4701-4)

The -1200V ADJ is provided to permit adjustment of the brightness level of the CRT. The control normalizes the special no-burn safety circuit against the voltage reference corona tube V110.

1. On the Main Frame, set SWEEP RATE switch to 2 SEC/CM and pull out the VERNIER control.

2. Set the DISPLAY LOGIC switch to MAIN SWP and FOCUS and ASTIG controls to center of range.

3. Turn the -1200V ADJ fully clockwise.

4. Connect a Simpson Model 260 or equivalent voltmeter from pin 6 of the Input Cathode Follower, V518 and V519, to ground.

5. Using the front panel INTENSITY control, adjust for an indicated reading of 70 volts.

6. Set -1200V ADJ to yield a low intensity reference spot.

7. Adjust FOCUS and ASTIG for optimum spot size.

b. PATTERN ADJ (R2301F, LV Module Schematic 8901 4711-4)

The PATTERN ADJ control is provided to optimize the CRT geometry for the left and right edges of the display.

1. Apply a 1 Kc signal from a Tektronix Type 105 or an equivalent Squarewave Generator to the Y Input connector.

2. On the Main Frame, set TRIGGER SOURCE to INT and SWEEP RATE to 1 MS/CM.

3. Adjust INTENSITY control until the display approaches normal brightness.

4. Set up the Oscilloscope for a 5 by 10-centimeter pattern.

5. Optimize the FOCUS and ASTIG control settings.

6. Switch the Squarewave Generator to 10 Kc.

7. Rotate the PATTERN ADJ throughout its range and observe the vertical edge at the left and right-hand sides of the 5 by 10-centimeter display.

8. Barreling at one extreme and pincushioning at the other extreme should be obtained.

9. Set the PATTERN ADJ to optimize the display at the left and right-hand sides.

c. Y DEFL PL SHIELD ADJ (R2301R, LV Module Schematic 8901 4711-4)

The Y DEFL PL SHIELD ADJ is provided to optimize the display for a flat top and a flat bottom on a minimum 5 centimeter scan. To accomplish this, carefully set the Y DEFL PL SHIELD ADJ so that this condition is obtained.

NOTE: The PATTERN ADJ (R2301F) and the Y DEFL PL SHIELD ADJ (R2301R) service adjustments are interdependent and may have to be repeated twice for optimum geometry setting.

1-14. X AMPLIFIER CENTERING AND PRE-CLIPPING ADJUSTMENTS

a. LENGTH (R5153, X Module Schematic 8901 4731-4)

The LENGTH control sets the Main Sweep length so that it occupies the width of the calibrator scale without hitting the sides of the cathode-ray tube with attendant electron scattering.

1. On the Main Frame, set the DISPLAY LOGIC switch to MAIN SWP and the SWEEP RATE to 5 MS/CM.

2. On the Y Plug-in Unit, set the VOLTS/CM switch to CAL and push in the VERNIER control.

3. Set the LENGTH adjustment so that 3 cycles of the calibrator pattern are displayed in 10.5 centimeters of the CRT scale.

b. X POS CENT (R5616, X Module Schematic 8901 4731-4)

The X POS CENT adjustment is provided so that the PATTERN POSITIONING control may be set to its electrical horizontal center when the trace is horizontally centered on the screen.

1. Remove V525.

2. Connect pin 3 of the Upper Level Cathode Follower, V525A, to +110 volts.

3. Connect pin 3 of the Lower Level Cathode Follower, V525B, to ground.

4. Set the Main TRIGGER SOURCE switch to OFF.

5. Connect the arms of the Horizontal Section of the PATTERN POSITIONING control (R6620F and R6620R) together. This may be conveniently accomplished by temporarily connecting a jumper across pins 4 and 16 of P5200.

6. Set the Horizontal Section of the PATTERN POSITIONING control to its electrical center. This is accomplished by connecting a Simpson Model 260 or an equivalent voltmeter from the jumper wire on pins 4 and 16 of P5200 (negative) to the plate pin 1, and then to the cathode pin 2, of the X Position Reference Diode, V526. Then adjust the PATTERN POSITIONING control so that equal voltages are obtained from these points.

7. Adjust X POS CENT to bring the start of the sweep to the left-hand edge of the CRT scale.

8. Remove the jumper across pins 4 and 16 of P5200. At this point, do not disturb the conditions outlined in steps 1, 2, and 3. They are needed for the X5 REG adjustment described in the next paragraph.

c. X5 REG (R5617 X Module Schematic 8901 4731-4)

The X5 REG adjustment is provided so that equal expansion of the display from left and right of center will occur when the EXPAND switch is set from X1 to X5.

1. On the Main Frame, set SWEEP RATE switch to 2 SEC/CM and the DISPLAY LOGIC switch to R.O.

2. Pull out the Main VERNIER control and turn it fully counterclockwise.

3. Set the X and Y Read-Out switches to 000. This is done so that the scaling and index dots coincide, thus only one dot appears.

4. Use the INDEX POSITIONING control to move the read-out dot to the exact center of the calibrator scale.

5. Set the EXPAND switch to X5 and adjust the X5 REG to bring the dot back to the exact center of the scale.

6. Restore V525 to its socket and remove the jumpers connected on pins 3 and 6.

NOTE: Time sharing will cause the display of dots and sweep to be seen only on a half-time basis. In other words, you alternately see first the dots, then the trace, etc.

d. WINDOW-LEVEL ADJUSTMENTS: X1 ADJ AND X5 ADJ (R6503 and R6502, X Module Schematic 8901 4731-4)

The window-level adjustments (X1 ADJ and X5 ADJ) are provided to set the voltages of the diode clippers (CR5502 and V523) which prevent excessive input to the X amplifier. These clipping diodes are necessitated by the feedback circuits employed in the X amplifier and prevent time distortion when signals of varying repetition rates are displayed.

1. Insert the network shown in Figure 1-2 in series with the horizontal deflection plate and the X amplifier output.

2. On the Main Frame, set the DISPLAY LOGIC switch to MAIN SWP, SWEEP RATE switch to 10 MS/CM, and push in the VERNIER control.

3. Set EXPAND switch to X1 and adjust the Window-Level X1 ADJ to produce a pattern which is symmetrically

clipped at either end of the CRT scale. In other words, distance A in Figure 1-3a will be equal to distance B in Figure 1-3b. It will be necessary to move the PATTERN POSITIONING control to locate the left and right-end clipping levels.

4. Repeat the procedure described in step 3 by setting the EXPAND switch to X5, and note the following exception. The X5 ADJ is set so that the pattern starts 0.4 centimeter closer to the left edge of the CRT scale than the right edge. In other words, distance A in Figure 1-3a is shortened by 0.4 centimeter.

5. After the Window-Level adjustments are made, remove the network installed in step 1.

e. SETTING X AMPLIFIER TRIMMER CAPACITORS

(X1 Trimmer C5602, X5 Trimmer C5605, and HF Feedback Compensation C5628; X Module Schematic 8901 4731-4)

The X amplifier employs voltage feedback for linearization and gain stability. The feedback networks must give the same feedback at low and high frequencies to avoid distortion. Trimmer capacitors are provided to normalize the high frequency feedback with the feedback at low frequencies.

1. Set the Main Frame controls as follows:

DISPLAY LOGIC	R.O.
TRIGGER SOURCE	+LINE
VOLTS/CM	CAL
SWEEP RATE	10 MS/CM
Vertical Readout	000
Horizontal Readout	999
SWITCH MODE	CHOP
EXPAND	X1

2. With INDEX POSITIONING control, move the index dot to the left edge of the scale. The scaling dot should now be at the right edge of the scale.

3. Simulate for stray capacity by placing a metal cover near the chassis.

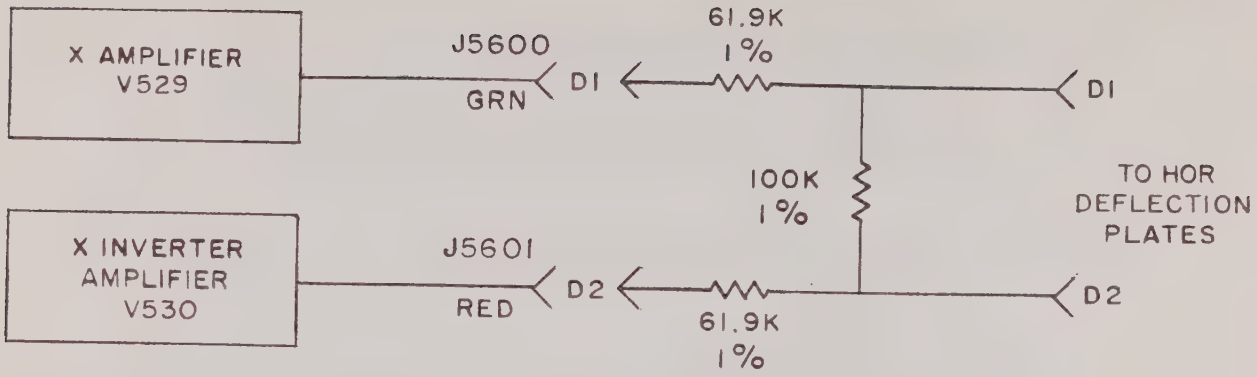
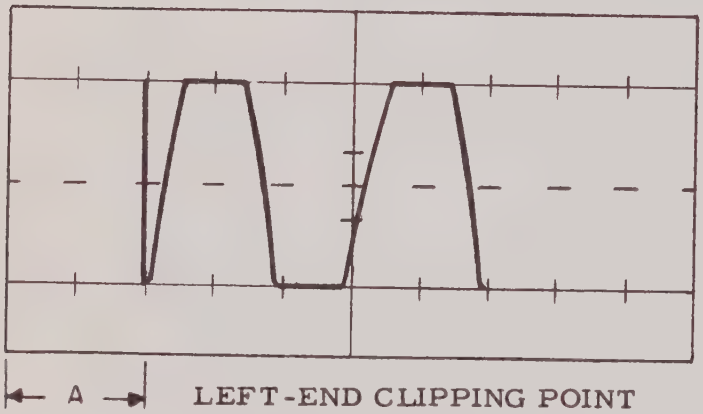


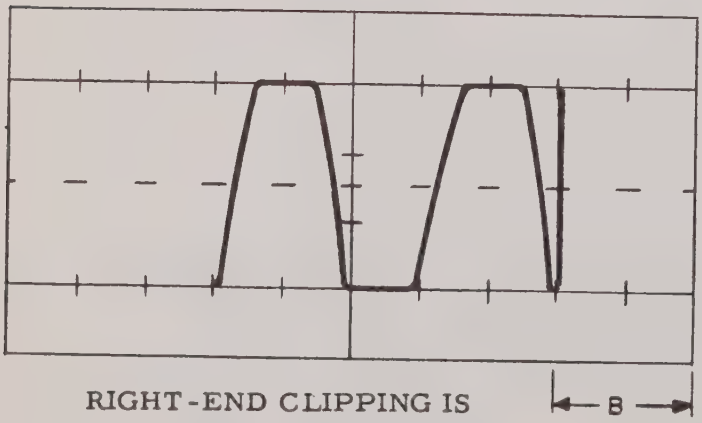
FIGURE 1-2. NETWORK FOR WINDOW-LEVEL ADJUSTMENTS



LEFT-END CLIPPING POINT IS LOCATED BY MOVING PATTERN POSITIONING CONTROL TO THE LEFT

FIGURE 1-3a.

DISPLAY ILLUSTRATING LEFT-END CLIPPING OF THE PATTERN



RIGHT-END CLIPPING IS LOCATED BY MOVING PATTERN POSITIONING CONTROL TO THE RIGHT

FIGURE 1-3b.

DISPLAY ILLUSTRATING RIGHT-END CLIPPING OF THE PATTERN

4. Adjust the X1 trimmer until the pattern obtained in Figure 1-4a appears.

5. Set the EXPAND switch to X5 and adjust the X5 trimmer for the same condition in step 4. Figure 1-4b indicates improper adjustment of either the X1 or X5 trimmer.

6. The High-Frequency Feedback Compensation is adjusted for the cleanest display on both ranges (EXPAND switch is set to X1 or X5). Figure 1-4c indicates the improper adjustment of this trimmer.

7. Reset EXPAND switch to X1.

f. Y RO BAL ADJ (R7029, Main Frame Module Schematic 8901 4741-4)

A POLARITY switch is provided for the Vertical Read-Out signal. The Y RO BAL ADJ is set to maintain the dc level of the indexing dot at the same point at either polarity position.

1. Set DISPLAY LOGIC switch to R.O. and with the INDEX POSITIONING control, move the index dot to the bottom of the CRT scale.

2. Using the Vertical Read-Out switches, position the scaling dot to the top of the CRT scale.

3. Set the Y RO BAL ADJ so that there is no depositioning of the index dot when the POLARITY switch is set from (+) to (-).

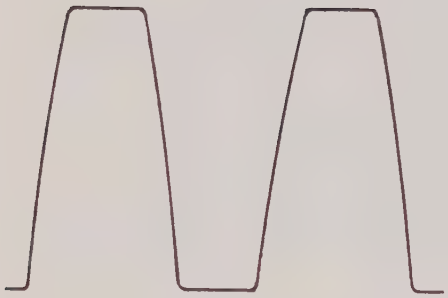


FIGURE 1-4a

NORMAL DISPLAY ILLUSTRATING PROPER ADJUSTMENT OF C5602, C5605 & C5628

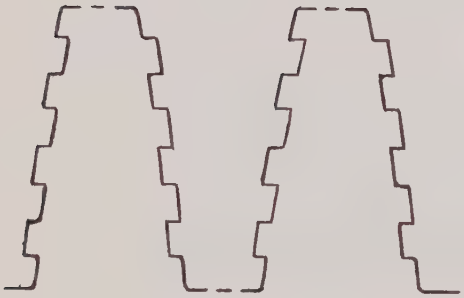


FIGURE 1-4b

DISPLAY ILLUSTRATING IMPROPER ADJUSTMENT OF C5602 ON X1 SCALE OR C5605 ON X5 SCALE

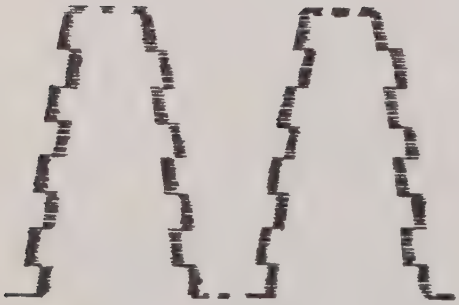


FIGURE 1-4c

DISPLAY ILLUSTRATING IMPROPER ADJUSTMENT OF THE HF FEEDBACK TRIMMER, C5628

g. X RO CAL ADJ (R7127, Main Frame Module Schematic 8901 4741-4)

The X RO CAL ADJ is provided in the horizontal Read Out channel to (1) calibrate the Read-Out signal using the CRT scale or (2) to normalize the Read-Out signal with an external standard.

1. Set Main Frame controls as follows:

DISPLAY LOGIC	R.O.
SWEEP RATE	5 MS/CM
Vertical Readout	000
Horizontal Readout	49.9 MS
VOLTS/CM	CAL

2. Center the display with the PATTERN POSITIONING control.

3. Using the INDEX POSITIONING control, move the index dot so that it starts at the beginning of the first cycle.

4. Set the X RO CAL ADJ so that the scaling dot starts exactly at the beginning of the fourth cycle.

1-15. Y SENSITIVITY ADJUSTMENTS

a. GENERAL

Sensitivity adjustments are provided for each vertical channel in the Main Frame of the Type 425 Oscilloscope. The Type 4207 Y Test Plug-in Unit may be used to normalize the gain of both channels to 125 millivolts/centimeter. When the Type 4207 Y Test Plug-in Unit is not available, the AMPL A GAIN may be adjusted by normalizing the read-out to the scale. It is then advisable to set AMPL B GAIN in a similar position to that of AMPL A GAIN. A check of the Main Frame sensitivity may be made by using a Du Mont Type 4201, 4202, or 4205 Plug-in Unit and testing to see whether the calibrator signal will occupy 4 centimeters of vertical deflection without setting the VERNIER control for maximum gain.

b. AMPL B GAIN ADJUSTMENT FOR MAIN FRAME SIGNAL CHANNEL

(R3012, Y Switch and Driver, LV Module Schematic 8901 4711-4)

1. Return DISPLAY LOGIC switch to MAIN SWP.

2. Set CHANNEL SELECTOR switch to B.

3. Adjust AMPL B GAIN for four centimeters of vertical deflection.

4. Set CHANNEL SELECTOR switch to A and B. Compare both signals; they should both displace four centimeters of vertical deflection.

c. AMPL A GAIN ADJUSTMENT FOR MAIN FRAME READ OUT CHANNEL

(R3011, Y Switch and Driver, LV Module Schematic 8901 4711-4)

1. Install a Type 4207 Y Test Unit.

2. Set CHANNEL SELECTOR switch to A and the RELAY toggle switch to ON.

3. Set DISPLAY LOGIC switch to MAIN SWP.

4. Adjust AMPL A GAIN for four centimeters of vertical deflection.

5. Set DISPLAY LOGIC switch to R.O. and the Vertical Read-Out switches to 200. The Read Out dots should now be spaced four centimeters apart.

d. INT SYNC DC ZERO (R3116F, Y Switch and Driver, LV Module Schematic 8901 4711-4)

The INT SYNC DC ZERO adjustment sets the triggering level in the dc position of the TRIGGER MODE switch. It is set so that the Main Sweep will trigger in the PRESET position of the TRIG LEVEL control when the trace is centered vertically.

1. With signal input, center the trace in the horizontal center of the screen using the PATTERN POSITIONING control.

2. Connect a Simpson Model 260 or an equivalent voltmeter from P6400, pin 24 (positive) to ground.

3. Adjust for an indicated reading of zero volts. J6400, pin 24 returns to the cathode of the Internal Sync Cathode Follower, V307.

1-16. DISTRIBUTED AMPLIFIER TEST AND ALIGNMENT PROCEDURE

The adjustments of the Trimmers in the Distributed Amplifier and Delay Line, have been carefully set at the factory and do not normally require readjustment. If a complete alignment procedure is desired, it is suggested that the instrument be returned to the factory. Minor adjustments may be made as follows:

1. Check to see that all Delay Line Trimmers have been set 9/32" from the fibre washers and the Amplifier Trimmers 7/16" from the fibre washers. Set peaking coils L4100 and L4101 to maximum counterclockwise position.

2. Install a Du Mont Type 4207 Y Test Plug-in Unit in the Main Frame.

3. Apply power to the Main Frame and allow five minutes for the instrument to warm up. Meanwhile, preset front-panel controls as follows:

Control	Setting
EXPAND	X5
SWEEP RATE	0.05 us/cm
DISPLAY LOGIC	MAIN SWP
TRIGGER SOURCE	+ INT
TRIGGER MODE	NORMAL AC
STABILITY AND TRIG LEVEL	PRESET

4. On the Y Plug-in Unit, set the CHANNEL SELECTOR switch to A, and the RELAY toggle switch to ON.

NOTE

Do not turn any one trimmer more than one-half turn at a time.

5. Start with the trimmer nearest the 590-ohm reverse termination resistor and adjust the Distributed Amplifier Trimmers counterclockwise until approximate alignment of this section is obtained.

6. Continue alignment along the delay line until the top of the displayed test pulse is a straight line. Decrease the sweep rates occasionally to check for tilt in the alignment.

TABLE 1-1. ADJUSTMENTS TO BE MADE WHEN REPLACING TUBES

NOTE: If the tube is replaced with an unaged tube, some of the adjustments may need to be reset after 50 hours of operation. The table below indicates which adjustments should be reset at that time.

SYMBOL	TYPE	SERVICE ADJUSTMENTS	RESET AFTE 50 HOURS
HIGH VOLTAGE POWER SUPPLY MODULE (Schematic 8901 4701-4)			
V101	K1736P (CRT)	-1200V ADJ (R1000), PATTERN ADJ (R2301F), Y DEFL PL SHIELD (R2301R), SWP CAL (R6603), AMP A GAIN (R3011), AMP B GAIN (R3012), and LENGTH (R5153)	No for all adjustments
V102	12AU7	-1200V ADJ (R1000)	Yes
V103	6CZ5	None	No
V104 thru V106	5642	SWP CAL (R6603), AMP A GAIN (R3011), AMP B GAIN (R3012), and LENGTH (R6153)	No for all adjustments
V107	5642	None	No
V108 & V109	5642	SWP CAL (R6603), AMP A GAIN (R3011), AMP B GAIN (R3012), and LENGTH (R6153)	No for all adjustments

TABLE 1-1. ADJUSTMENTS TO BE MADE WHEN REPLACING TUBES
(Continued)

SYMBOL	TYPE	SERVICE ADJUSTMENTS	RESET AFTER 50 HOURS
	LOW VOLTAGE POWER SUPPLY MODULE (Schematic 8901 4711-4)		
V201	6BJ8	None	No
V202	6336	None	No
V203	6BR8-A	None	No
V204	6336	None	No
V205	6BR8-A	None	No
V206	ECC83/12AX7	+255 ADJ (R3106R)	Yes
V207	6336	None	No
V208	6BR8-A	None	No
V209	ECC83/12AX7	+110 ADJ (R2169F)	Yes
V211	6BR8-A	None	No
V212	ECC83/12AX7	-150 ADJ (R2169R)	Yes
V213	OG3	-1250 ADJ (R2169R)	No
	Y SWITCH AND DRIVER, LV MODULE (Schematic 8901 4711-4)		
V301 thru V307:	No Adjustment Required		
	Y DISTRIBUTED AMPLIFIER AND DELAY LINE MODULE (Schematic 8901 4721-4)		
V401 thru V407:	No Adjustment Required		

TABLE 1-1. ADJUSTMENTS TO BE MADE WHEN REPLACING TUBES
(Continued)

SYMBOL	TYPE	SERVICE ADJUSTMENTS	RESET AFTER 50 HOURS
	X MODULE (Schematic 8901 4731-4)		
V501	6922	SWP MODE PRESET (R6167)	Yes
V502	6BC7	SAW START LEVEL (R5222R)	Yes
V503	6BA8-A	None	No
V504	6BA8-A	None	No
V505	7119	None	No
V506	6922	SWP MODE PRESET (R6167), and SAW START LEVEL (R5222R)	Yes
V507	6922	LENGTH (R5153)	Yes
V508	6922	None	No
V509	6BA8-A	CLAMP ADJ (R5222F)	Yes
V510	6BA8-A	SAW START LEVEL (R5222R), SWP CAL (R6603)	Yes
V511	OG3	SWP MODE PRESET (R6167), and SWP CAL (R6603)	Yes
V512	6BA8-A	None	No
V513	6BR8-A	SWP CAL (R6603)	Yes
V514	6DJ8	None	No
V515	6922	None	No
V516	6BK7-B	None	No

TABLE 1-1. ADJUSTMENTS TO BE MADE WHEN REPLACING TUBES
(Continued)

SYMBOL	TYPE	SERVICE ADJUSTMENTS	RESET AFTER 50 HOURS
		X MODULE (continued) (Schematic 8901 4731-4)	
V518 & V519	6BA8-A	SAW START LEVEL (R5222R)	Yes
V520	6AW8-A	None	No
V521 & V522	6BA8-A	None	No
V523	6BJ8	X5 ADJ (R6502) and X1 ADJ (R6503)	Yes
V524	6AW8-A	X5 ADJ (R6502) and X1 ADJ (R6503)	Yes
V525	7119	X5 ADJ (R6502) and X1 ADJ (R6503)	Yes
V526	OG3	None	No
V527	6DJ8	X5 ADJ (R6502) and X1 ADJ (R6503)	Yes
V528	6922	None	No
V529	6BQ5/EL84	X5 ADJ (R6502) and X1 ADJ (R6503)	Yes
V530	6CW5/EL86	None	No

TABLE 1-1. ADJUSTMENTS TO BE MADE WHEN REPLACING TUBES
(Concluded)

SYMBOL	TYPE	SERVICE ADJUSTMENTS	RESET AFTER 50 HOURS
		MASTER CLOCK AND SYNC AMPLIFIER, MAIN FRAME MODULE (Schematic 8901 4741-4)	
V601	6922	None	No
V602	7119	None	No
V610	6922	None	No
V611	6922	TRIG LEVEL CENT (R6125)	Yes
V612	6922	TRIG LEVEL CENT (R6125), SWP MODE PRESET (R6167), and AUTO SYNC ADJ (R6153)	Yes for all
V613	6BA8-A	AUTO SYNC ADJ (R6153) and TRIG LEVEL CENT (R6125)	Yes
V614	6BA8-A	TRIG SENS (R6139) and AUTO SYNC ADJ (R6153)	Yes
		READOUT GENERATOR, MAIN FRAME MODULE (Schematic 8901 4741-4)	
V701	6922	None	No
V702	6BC7	None	No
V703	6922	None	No
V704 & V705	6BC7	None	No
V706	6922	None	No
V707	6922	Y RO BAL ADJ (R7029)	Yes
V708	6BK7-B	None	No

SECTION 2

PERFORMANCE ASSURANCE TEST

2-1. MAINTENANCE CHECK TO ASSURE PERFORMANCE

The tests described in the paragraphs to follow should be performed by Instrument Test Departments and Maintenance Laboratories to certify proper performance of the Type 425 Oscilloscope. These tests are divided into sections for simplification and to assist those test groups where complete checking is not mandatory, or where all test equipment is not available.

NOTE

If this oscilloscope is checked by a receiving inspection laboratory, the tests outlined below are recommended to certify performance. The Type 425 Oscilloscope has been thoroughly tested and aged at the factory. Nevertheless, rough shipment, extreme environments, or long idle periods may necessitate minor adjustments of the controls. Hence, it is suggested that the certifying engineer try the recommended adjustments not only for recentering the controls, but also to ascertain their range and to familiarize himself with this precision instrument. If, after performing all the tests outlined below, the instrument will not perform to specifications, the assistance of the local Du Mont Field Engineering Representative should be requested.

2-2. CHECKING THE POWER SUPPLY

1. Check fuses for proper value.

2. Check and clean air filters.

3. Oil the fan motor with a few drops of light oil every few months.

4. Examine the instrument for charred or mechanically damaged components, loose connectors, and improperly seated tubes; correct all defects.

5. Install Y Plug-in Unit (Types 4201, 4202, or 4205).

6. Install the Type 4203 Delaying Sweep Plug-in Unit. If this unit is not available, use the Type 4204 or any other X Plug-in Unit.

   Note: Only a limited number of tests may be made without the Type 4203 Plug-in Unit. The performance of the Delaying Sweep, Main and Delaying Sweep, and Independent Display positions of the DISPLAY LOGIC switch can not be checked adequately without the Type 4203 Delaying Sweep Plug-in Unit.

7. Apply power to the Type 425 Oscilloscope through a variable voltage source (Variac or an equivalent). Set the line voltage to 115 volts. (Double this value for 230-volt operation.)

8. Apply the calibration signal to the vertical system and display the Main Sweep at a rate of 10 milliseconds/cm.

9. Set Main TRIGGER MODE switch to NORMAL AC, STABILITY and TRIG LEVEL controls to PRESET, and TRIGGER SOURCE switch to +LINE.

10. Allow 20 minutes for warmup before making any adjustments. Replace the covers while waiting to avoid overheating the instrument.

11. Lower the line voltage until the display starts to drift, or becomes erratic. The line voltage must be less than 105 volts (210 volts for 230-volt operation). If instability is noted, check operation of the low-voltage power supplies.

12. Raise the line voltage to 125 volts (250 volts for 230-volt operation). The display should remain stable and must not be erratic. If instability is noted, check operation of the low-voltage power supplies.

13. Reset the line voltage to 115 volts (230 volts for 230-volt operation).

displays a base line with the Read-Out dots. Twenty to fifty degrees rotation of the STABILITY control should produce no sweep action. If a trace should occur during the rotation interval mentioned, then the SWEEP MODE PRESET adjustment (R6167) should be reset according to the instructions given in Section 1 of this Manual. Return the STABILITY control to PRESET.

5. Turn the Main TRIGGER MODE control to AUTO SLOW and then to AUTO FAST. A base line with Read-Out dots should be displayed in each case. Note that the base line and Read-Out dots will appear to alternate.

2-5. CHECKING SWEEP CALIBRATION

If it is desired to check all sweep rate calibrations, a very accurate ($\pm$1/2%) time standard such as the Tektronix Type 180A Time Marker Generator, or equivalent, should be available. Use the front panel screwdriver SWP CAL control for setting the 10 MS/CM range. If large errors are noted on the higher sweep rates, refer to the paragraph entitled "Checking the Main Sweep" in this Section.

1. Set the EXPAND switch to X1.

2. Set up the Time Marker Generator so that 10 pulses are displayed on the oscilloscope on every range of the SWEEP RATE control.

3. If the second pulse of the display is positioned to fall one centimeter from the left edge of the scale, then the ninth pulse should be spaced 8 centimeters ($\pm$4 mm) apart from this pulse. In other words, time calibration checks are made within an 8-centimeter centered portion of the scale.

   NOTE: When making these checks, exercise care to avoid errors in scale parallax. On the slower SWEEP RATE ranges, use a stop watch or other appropriate device; the time duration is still measured between the 1 and 9-centimeter marks on the scale.

4. The above sweep calibration checks may be repeated when the EXPAND switch is set to X5, thereby increasing the effective sweep length to 50 centimeters. The maximum tolerance now becomes 7.5 millimeters, averaged over the 8-centimeter centered portion of the scale. On the

10 nanoseconds/cm and 20 nanoseconds/cm ranges, an additional 20% crowding of the display is permissible, averaged over the first 4.5 centimeters of the trace starting from the left.

5. Disconnect the Time Marker Generator from the Oscilloscope.

2-6. CHECKING Y SENSITIVITY ADJUSTMENTS

1. On the Main Frame, set the TRIGGER MODE control to NORMAL AC, TRIGGER SOURCE switch to + LINE, DISPLAY LOGIC switch to R.O., and the TRIG LEVEL and STABILITY controls to PRESET.

2. On the Y Plug-in, set the VOLTS/CM switch to CAL. The calibrator display should now appear on the screen with the Read-Out dots.

3. Set the X Read-Out switch to 000 and the Y Read Out switch to 200.

4. Using the INDEX POSITIONING control, center the Read-Out dots to the middle of the screen.

5. If the Read-Out dots are not spaced exactly 4 centimeters apart, reset AMPL B GAIN (R3012) adjustment, located on the Low-Voltage Power Supply Module, until this condition is obtained.

6. Remove the vertical amplifier Plug-in Unit and install the Type 4207 Y Test Unit Plug-in Unit.

7. Set the Main TRIGGER SOURCE switch to +INT.

8. On the Y Test Plug-in Unit, set the CHANNEL SELECTOR switch to A and the RELAY toggle switch to ON.

9. Adjust AMPL A GAIN (R3011), located on the Low-Voltage Power Supply Module, for exactly four centimeters of vertical deflection. If the Type 4207 Y Test Unit is not available, see instructions in Section 1 of this Manual.

2-7. CHECKING RISE TIME AND DELAY-LINE REGULARITY

1. If a check of rise time, peaking or delay line regularity is desired, use the Du Mont Type 4207 Y Test Unit. To observe rise time of the displayed signal, sweep rates in the range of 10 nanoseconds/cm to 0.10 usec/cm should be used.

2. At a sweep rate of 10 nanoseconds/cm, the base line of the signal pulse should extend for 3 or more centimeters from the left endoof the sweep. Starting from the initial 10% rise of the pulse, the length of the rise-time interval should extend from 0.85 to 1.1 centimeters. The Main Frame 10-90% push-button control may be used for rise-time measurements.

3. If the slower sweep rates show irregularities exceeding 1-1/2—line width over the first 400 nanoseconds of the signal pulse, the delay line trimmers require adjustment as outlined in Section 1 of this Manual.

   NOTE: The delay lines normally do not require readjustment. Do not tamper with or adjust the delay line trimmers since their adjustment is exacting and requires the tools and techniques specified in Section 1 of this Manual.

4. On the 0.10 usec/cm sweep range, the overshoot and preswing of the display should not exceed 6% of the normal amplitude of the waveform.

2-8. CHECKING BANDWIDTH

Do not attempt bandwidth certification of this Oscilloscope without checked and standardized test equipment.

1. To check the bandwidth of this Oscilloscope, procure the following equipment:

   a. Du Mont Type 4285 50-ohm Termination Adapter.

   b. Measurements Corp. Model 80 calibrated standard Signal Generator or equivalent.

   c. A short length of RG-8A/U cable with connectors in good condition.

2. Install the Du Mont Type 4201 Dual Trace Y Plug-in Unit and set the VOLTS/CM switch to 0.05 V/CM.

3. On the Main Frame, set the STABILITY control to RECURrent, the SWEEP RATE to 1 MS/CM, and the DISPLAY LOGIC switch to MAIN SWP.

4. Set the Signal Generator to 100 Kc and connect its output to the Y Input connector through the 50-ohm Terminal Adapter.

5. Adjust the output of the Signal Generator to give five centimeters of vertical deflection on the screen. Note the standardized output attenuator settings of the Signal Generator.

6. Increase the frequency of the Signal Generator to 35 Mc and reset the output attenuators to exactly the same settings used at 100 Kc.

7. The vertical bar should now have shrunk so that it occupies more than 3.25 cm and less than 3.80 cm.

NOTE: Be sure the output attenuator, measuring bolometer, and frequency settings of the Signal Generator are checked before testing bandwidth. Beware of parallax errors in reading the CRT scale.
Recheck the test setup and all equipment to make certain that the oscilloscope is being checked accurately.

2-9. ADDITIONAL TESTS FOR TIME-SHARED DISPLAYS

If further tests are desired, it is suggested that the Test Engineer follows the procedures in the Operator' s Manual for obtaining Delayed Sweep, Dual-trace operation, Main and Delayed Sweeps, and Independent Displays (time-shared dual-beam displays). Should these operation modes prove unstable or inoperative, and the procedure has been carefully followed, check the detailed maintenance procedure in Section 1 of this Manual for instructions.

2-10. ADDITIONAL CHECKS FOR VERTICAL READ-OUT ACCURACY

If a dc voltage standard is available, it is advisable to double check the vertical Read-Out calibration by applying a known signal to the Y Input connector on the Plug-in Unit. Make sure that the Y Plug-in Unit has initially been calibrated with the internal calibrator signal. The vertical Read-Out will then measure the dc voltage standard within an accuracy of 30 parts/1000 (full scale). Normally the error will be less than ±25 parts/1000 and may be reset by the AMPL B GAIN (R3012) adjustment to any desired value. The reset accuracy will then be ±5 parts/1000.

A double check of the -150-volt and +110-volt power supplies may also be made if a ±0.5% (incremental) voltmeter such as the John Fluke Model 800 or equivalent is available. These two supply busses will adversely affect calibration if they are not properly set.

SECTION 3

ELECTRICAL PARTS LIST AND SCHEMATICS

PARTS LIST FOR HIGH VOLTAGE POWER SUPPLY MODULE

Symbol	Part Number	Description
	CAPACITORS (1000)	
Note: All capacitors are fixed, and ceramic, unless otherwise specified.		
C1000	0318 4340	plastic, 0.1 uf, ±20%, 600V
C1001	0318 3710	plastic, 0.1 uf, ±20%, 400V
C1002	0318 3950	plastic, 0.0047 uf, ±10%, 400V
C1003	0319 1910	paper, 0.022 uf, ±10%, 1600V
C1004	0310 1270	1000 uuf, +100 -0%, 1000V
C1005 & C1006	0318 4340	plastic, 0.1 uf, ±20%, 600V
C1007	0319 1720	mica, 620 uuf, ±10%, 1000V
C1008	0319 1710	mica, 470 uuf, ±10%, 1000V
C1011 & C1012	0319 4510	paper, 470 uuf, ±10%, 10,000V
C1013	0319 4600	paper, 0.0047 uf, ±10%, 6000V
C1014 to C1019	0316 4930	0.01 uf, +100 -0%, 2000V
	NEON REGULATOR	
E1000	1201 1680	lamp, glow, NE96
	ELECTRICAL CONNECTORS	
J1001	0905 7640	receptacle, female, 1 contact
J1002	0905 7510	receptacle, female, 3 contacts
J1003	0904 1290	receptacle, female, 2 contacts
J1004	0905 4840	jack, tip, white
P1003	0904 1460	plug, male, 2 contacts

Symbol	Part Number	Description
	RESISTORS (1000)	
Notes: 1.	All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.	
2.	Resistance values in ohms: K = thousand M = million	
R1000	0108 4800	variable, wire wound, 10K, ± 10%, 2W
R1001	0227 8750	wire wound, 33K, 5W
R1002	0229 3620	film, 2.37M, ± 1%, 1W
R1003	0203 1610	47, ± 10%
R1004	0203 1120	470K
R1005	0203 1610	47, ± 10%
R1006	0229 3750	film, 17M, ± 1%, 2W
R1007 & R1008	0239 1405	film, 22K, 2W
R1009	0203 0940	82K
R1011	0203 0570	240Ω
R1012	0223 9290	wire wound, 2K, ± 10%, 5W
R1013	0203 4310	3M, 1W
R1014 & R1015	0203 0480	1K
R1016	0203 0720	10K
R1017 & R1018	0203 7230	1.3M, 2W
R1019	0203 4170	750K, 1W
R1021	0203 0610	360Ω
R1022	0203 1200	1M
R1023	0203 2070	330K, ± 10%
R1024	0203 2250	10M, ± 10%
R1025	0203 0960	100K
	TRANSFORMERS	
T1000	2001 2611	CRT, filament
T1001	2001 3581	High Voltage Supply

PARTS LIST FOR HIGH VOLTAGE POWER SUPPLY MODULE (Concluded)

Symbol	Part Number	Description
	ELECTRON TUBES	
* V101	2501 2440	K1736P-1
	2501 2450	K1736P-2
	2501 2460	K1736P-7
	2501 2470	K1736P-11
V102	2501 1610	ECC82/12AU7
V103	2501 1670	6CZ5
V104 to V109	2500 5740	5642
V110	2501 2240	GV3A 1300
	CABLE ASSEMBLY	
W1001	5028 6291	assembly, cable, includes P1000
---	0905 7490	P1000, connector, electrical, plug, male, 11 contacts; part of cable assembly W1001

* Depending on sales order

PARTS LIST FOR LOW VOLTAGE POWER SUPPLY; LV MODULE

Symbol	Part Number	Description
	CAPACITORS (2100)	
Note: All capacitors are fixed, ceramic and 500V, unless otherwise specified.		
C2100 & C2101	0310 1270	1000 uuf, +100 -0%, 1000V
C2103	0319 4460	electrolytic, 150 uf, -10 +100%, 300V
C2104	0319 0310	0.04 uf
C2106	0318 3730	plastic, 0.022 uf, +20%, 400V
C2107	0310 1270	1000 uuf, +100 -0%, 1000V
C2108	0301 8260	electrolytic, 8 uf, +50 -10%
C2109	0318 0270	plastic, 0.1 uf, +20%, 150V
C2110	0312 2430	0.02 uf, +100 -0%
C2111 to C2114	0319 4450	electrolytic, 80 uf, -10 +50%, 475V
C2115	0316 7110	2.2 uuf, ±0.25%
C2117	0318 3730	plastic, 0.022 uf, +20%, 400V
C2118	0310 1270	1000 uuf, +100 -0%, 1000V
C2119 A,B,C	0300 2180	electrolytic, 10/10/10 uf, +50 -10%, 450V
C2120	0310 1270	1000 uuf, 1000V
C2121 & C2122	0319 4460	electrolytic, 150 uf, -10 +100%, 300V
C2123	0312 2430	.02 uf, +100 -0%
C2124	0316 7110	2.2 uuf, ±0.25%
C2125	0319 9010	plastic, 0.1 uf, +20%, 150V
C2126	0310 1270	1000 uuf, +100 -0%, 1000V
C2130	0310 1270	1000 uuf, 1000V
C2131 & C2132	0319 4480	electrolytic, 125 uf, -10 +100%, 350V
C2133	0312 2430	0.02 uf, +100 -0%
C2134	0316 7110	2.2 uuf, +0.25%
C2135	0319 9010	plastic, 0.1 uf, ±20%, 150V
C2136	0318 8770	electrolytic, 30 uf, 250V
C2137	0310 1270	1000 uuf, +100-0%, 1000V
C2138	0318 3730	plastic, 0.022 uf, ±20%, 400V

PARTS LIST FOR LOW VOLTAGE POWER SUPPLY: LV MODULE
(Continued)

Symbol	Part Number	Description
	CAPACITORS (2300)	
Note: All capacitors are fixed, ceramic, and 500V unless otherwise specified.		
C2300 to C2302	0310 1270	0.001 uf, +100 -0%, 1000V
C2311	0310 1270	0.001 uf, +100 -0%, 1000V
C2312 to C2319	0312 2430	0.02 uf, +100 -0%
C2321	0318 0220	plastic, 0.22 uf, ±20%, 150V
C2331 to C2334	0319 0450	0.001 uf
	SEMICONDUCTORS	
CR2100 to CR2122	2600 6370	diode, silicon, 1N1169
	FUSES	
F2100	1100 0820	115-volt operation, 8 amperes
F2101	1100 5260	115-volt operation, 6.25 amperes, slow-blow
F2100	1100 0800	230-volt operation, 4 amperes
F2101	1100 5210	230-volt operation, 3 amperes
	ELECTRICAL CONNECTORS	
J1000	3400 1760	socket, 11 pin
J2100	0905 7510	receptacle, female, 3 contacts
J4000	3400 5361	socket, 9 pin
J5000	0905 7350	receptacle, female, 24 contacts
J8400	0905 7360	receptacle, female, 32 contacts
J9000	0905 7360	receptacle, female, 32 contacts
	RELAY	
K2100	0503 1210	armature, general purpose, 110 vdc, 6 poles, double throw
	ELECTRICAL CONNECTORS	
P6000	0905 7340	plug, male, 32 contacts
P6400	0905 7330	plug, male, 24 contacts
P2100	0905 7840	plug, male, 3 contacts

Symbol	Part Number	Description
	RESISTORS (2100)	
Notes: 1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.		
	2. Resistance values in ohms: K = thousand M = million	
R2100 & R2101	0239 0161	wire wound, tapped, 2 ohms, 20W and
R2102	0203 0820	27K 5 ohms, 30W
R2103	0203 0940	82K
R2104	0203 0920	68K
R2105	0203 0960	100K
R2106 & R2107	0203 0320	220
R2111	0203 3960	100K, 1W
R2112	0239 0153	wire wound, 3K, 55W
R2113	0203 1770	1K, ± 10%
R2114	0203 1140	560K
R2115	0203 1070	300K
R2116	0203 0980	120K
R2117	0203 0920	68K
R2118	0203 1770	1K, ± 10%
R2119	0229 6690	film, 200K, ±0.5%
R2120	0203 1200	1M
R2121	0229 2620	film, 480K, ± 0.5%
R2122	0203 0550	2K
R2123 & R2124	0229 2620	film, 480K, ± 0.5%
R2125	0203 0960	100K
R2126 & R2127	0203 7030	200K, 2W
R2128 & R2129	0239 0152	wire wound, 1500, 55W
R2130	0203 0800	22K
R2131 to R2133	0203 6120	film, 33, 2W
R2134 to R2136	0203 1770	1K, ± 10%
R2137	0203 3910	62K, 1W
R2138	0203 1770	1K, ± 10%
R2139	0203 4200	1M, 1W
R2140	0203 0320	220
R2141	0203 3950	91K, 1W

PARTS LIST FOR LOW VOLTAGE POWER SUPPLY; LV MODULE
(Continued)

Symbol	Part Number	Description
	RESISTORS (2100)	
Notes: 1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.		
	2. Resistance values in ohms: K = thousand, M = million	
R2142	0203 0900	56K
R2143 & R2144	0203 1770	1K, ± 10%
R2145	0234 3850	film, 1M, ± 1%
R2146	0203 1050	240K
R2147	0203 1770	1K, ± 10%
R2148	0203 1200	1M
R2149	0234 3800	film, 402K, ± 1%
R2150	0203 0320	220
R2151	0234 3760	film, 232K, ± 1%
R2152	0203 3960	100K, 1W
R2153	0211 3630	wire wound, 5K, 5W
R2154	0239 0151	wire wound, 300, ± 3%, 55W
R2155	0203 6010	11, 2W
R2156	0239 0151	wire wound, 300, ± 3%, 55W
R2157	0203 1770	1K, ± 10%
R2158	0203 4140	560K, 1W
R2159	0203 0820	27K
R2160	0203 4140	560K, 1W
R2161	0203 0820	27K
R2162	0203 1770	1K, ± 10%
R2163	0234 3850	film, 1M, ± 1%
R2164	0203 1770	1K, ± 10%
R2165	0203 0990	130K
R2166	0203 1770	1K, ± 10%
R2167	0203 1200	1M
R2168	0234 3770	film, 237K, ± 1%
R2169 F,R	0108 5100	variable, wire wound, 10K/10K, ± 10%, 2W
R2170	0203 0320	220
R2171	0234 3690	film, 75K, ± 1%
R2173	0203 3960	100K, 1W
R2174 & R2175	0239 0151	wire wound, 300, ± 3%, 55W
R2176	0203 1770	1K, ± 10%

PARTS LIST FOR LOW VOLTAGE POWER SUPPLY; LV MODULE
(Continued)

Symbol	Part Number	Description
	RESISTORS (2100)	
Notes: 1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.		
	2. Resistance values in ohms: K = thousand M = million	
R2177	0203 3840	33K, 1W
R2178	0203 1770	1K, ± 10%
R2179	0203 1240	1.5M
R2180	0203 0320	220
R2181	0203 1310	3M
R2182	0203 4120	470K, 1W
R2183 & R2184	0203 0900	56K
R2185	0203 1770	1K, ± 10%
R2186	0234 3720	film, 118K, ± 1%
R2188	0203 1200	1M
R2189	0234 3810	film, 90,900, ± 1%
R2191	0203 1770	1K, ± 10%
R2192	0234 3850	film, 1M, ± 1%
R2193	0203 0990	130K
R2194	0203 1770	1K, ± 10%
R2195	0203 0960	100K
R2196	0203 3740	12K, 1W
	RESISTORS (2300)	
R2300	0203 0870	43K
R2301	0108 5310	variable, 100K/100K, ± 20%, 1W
R2302	0203 0550	2K
R2304	0203 0770	16K
R2305 & R2306	0203 0650	5100
R2320	0203 1310	3M
R2321	0203 1350	4.3M
R2322	0234 3790	film, 392K, ± 1%
R2323	0203 1610	47, ± 10%
R2324	0234 3840	film, 825K, ± 1%
R2325	0239 1374	film, 1500, 2W

PARTS LIST FOR LOW VOLTAGE POWER SUPPLY; LV MODULE
(Concluded)

Symbol	Part Number	Description
	THERMAL SWITCHES	
S211	0503 1470	relay, thermal, opens at 170°F, ±5°; closes at 130°F, ±7°
S212	0501 1270	relay, thermal, 115NO45T, 1 pole, 1 throw, normally open; operating time: 45 seconds, ± 10 seconds
	TRANSFORMERS	
T2100	2001 2051	power, step up
T2101	2001 2041	step up/step down
	TEST JACKS	
TP2100 to TP2103	0905 4840	jack, tip, pin type, insulated
	ELECTRON TUBES	
V201	2501 1970	6BJ8
V202	2501 1630	6336-A
V203	2501 1980	6BR8A
V204	2501 1630	6336-A
V205	2501 1980	6BR8A
V206	2501 1680	ECC83/12AX7
V207	2501 1630	6336-A
V208	2501 1980	6BR8A
V209	2501 1680	ECC83/12AX7
V211	2501 1980	6BR8A
V212	2501 1680	ECC83/12AX7
V213	2500 9270	OG3/85A2
	CABLE	
W2100	5028 5911	assembly, power, electrical, 3-conductor, #16 AWG, 5-1/2 feet

PARTS LIST FOR Y SWITCH AND DRIVER: LV MODULE

Symbol	Part Number	Description
	CAPACITORS	
Notes: 1. All capacitors are fixed, ceramic, and 500V, unless otherwise specified.		
	2. GMC denotes Guaranteed Minimum Capacitance	
C3000 to C3003	0318 7040	1.8 uuf, ±0.25%
C3004	0312 2430	0.02 uf, +100 -0%
C3005 & C3006	0319 5950	27 uuf, ± 10%
C3007	0318 3730	plastic, 0.022 uf, ±20%, 400V
C3008	0312 2430	0.02 uf, +100 -0%
C3010	0316 7110	2.2 uuf, ±0.25%
C3011 & C3012	0319 0450	1000 uuf, GMC
C3013	0310 1270	1000 uuf, +100 -0%, 1000V
C3014 & C3015	0319 0450	1000 uuf, GMC
C3016	0312 2430	0.02 uf, +100 -0%
C3017 & C3018	0319 1291	2000 uuf, 200V
C3019	0318 7040	1.8 uuf, ±0.25%
C3020	0319 1072	variable, plastic, 0.65-3.2 uuf
C3021	0326 4640	0.01 uf
C3022	0318 7040	1.8 uuf, ±0.25%
C3023	0312 2430	0.02 uf, +100 -0%
C3024	0316 7140	2.7 uuf, ±0.25%
C3025	0319 4680	0.01 uf
C3026	0312 2430	0.02 uf, +100 -0%
C3031 to C3036	0313 3700	composition, 0.1 uuf, ± 10%
C3037	0313 3830	composition, 1 uuf, ± 10%
	CAPACITORS (3100)	
C3100 to C3110	0313 3520	composition, 1.1 uuf, ± 5%
C3120 to C3130	0313 3520	composition, 1.1 uuf, ± 5%
C3141 to C3149	0316 7200	4.7 uuf, ± 20%
C3151 to C3160	0319 1072	variable, plastic, 0.65-3.2 uuf
C3162 & C3163	0316 7280	10 uuf
	SEMICONDUCTORS	
CR3000 & CR3001	2600 1920	germanium, 30 ma dc, 1N55A
	DELAY LINES	
DL3000 & DL3001	2101 8251	inductor, plate line
DL3002 & DL3003	2101 8261	inductor, delay line

Symbol	Part Number	Description
	RELAY	
K3000	0501 5331	DPDT, 110V DC operation
	COIL	
L3000	2102 0700	rf, fixed, 47 uh, ± 5%
	ELECTRICAL CONNECTORS	
P3001 & P3002	4101 0810	terminal, feedthru, insulated
	RESISTORS (3000)	

Notes: 1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.

2. Resistance values in ohms: K = thousand
M = million

R3000 to R3003	0203 1530	10, ± 10%
R3004 to R3007	0203 0310	200
R3008 & R3009	0228 4950	film, 3900, ± 2%, 2W
R3011 & R3012	0105 5610	variable, 500, ± 10%, 0.1W
R3013	0203 1130	510K
R3015	0203 1130	510K
R3017	0203 1130	510K
R3021	0203 1130	510K
R3031	0239 1373	film, 1300, 2W
R3032 & R3033	0203 0840	33K
R3034 & R3035	0203 0940	82K
R3036 & R3037	0203 1610	47, ± 10%
R3038 & R3039	0203 3740	12K, 1W
R3041	0229 6680	film, 110K, ± 0.5%
R3042	0203 1610	47, ± 10%
R3043	0229 6730	film, 19,600, ± 0.5%
R3044	0203 0920	68K

Symbol	Part Number	Description
	RESISTORS (3000)	

Notes: 1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.

2. Resistance values in ohms: K = thousand
M = million

R3051	0229 6240	film, 820, ± 1%
R3054 & R3055	0229 6240	film, 820, ± 1%
R3058	0229 6240	film, 820, ± 1%
R3059 & R3060	0203 1530	10, ± 10%
R3061 & R3062	0203 0900	56K
R3063 & R3064	0239 0337	film, 43,200, ± 1%
R3065 & R3066	0203 1580	27, ± 10%
R3067 & R3068	0203 0140	39
R3069	0203 1650	100, ± 10%
R3070	0239 1376	film, 1800, 2W
R3072 & R3073	0239 1885	film, 3900, 2W
R3074 & R3075	0228 7330	47, ± 20%, 0.25W
R3076 & R3077	0239 1403	film, 18K, 2W
R3078 & R3079	0239 1395	film, 9100, 2W
R3081	0203 1650	100
R3082 & R3083	0203 0560	2200
R3084	0239 1401	film, 15K, 2W
	RESISTORS (3100)	
R3100	0239 0379	film, 215K, ± 1%
R3101	0203 1610	47, ± 10%
R3102	0203 1120	470
R3103	0239 1194	film, 75K, ± 1%, 1 W
R3105	0234 3730	film, 130K, ± 1%
R3106	0108 5100	variable, wire wound, 10K/10K, ± 10%, 2W
R3108	0203 1610	47, ± 10%
R3109	0239 1403	film, 18K, 2W
R3111	0203 2010	100K, ± 10%
R3112	0229 7490	film, 301K, ± 1%
R3113	0234 3590	film, 13K, ± 1%
R3114	0234 3790	film, 392K, ± 1%

PARTS LIST FOR Y SWITCH AND DRIVER: LV MODULE (Concluded)

Symbol	Part Number	Description
	ELECTRON TUBES	
V301 & V302	2501 1760	E88CC/6922
V303	2501 2200	7119/E182CC
V304 to V307	2501 1760	E88CC/6922
	CABLE (shown as shielded wire on Schematics)	
---	5029 6240	rf, coaxial, 70 ohms nominal impedance, 20 uuf/ft nominal capacitance

Symbol	Part Number	Description
		CAPACITORS (4000)
Notes:	1. All capacitors are fixed, ceramic, and 500V unless otherwise specified.	
	2. GMC denotes Guaranteed Minimum Capacitance	
C4001 to C4007	0319 0450	1000 uuf, GMC
C4011 to C4017	0319 1255	variable, plastic, 0.4 - 3 uuf, 350V
C4020	0311 4930	470 uuf, +100 -0%
C4021 to C4026	0310 1270	1000 uuf, +100 -0%, 1000V
C4027	0311 4930	470 uuf, +100 -0%
C4028	0315 3740	4700 uuf, +100 -0%
C4031 & C4032	0310 1270	1000 uuf, +100 -0%, 1000V
C4041 & C4042	0310 1270	1000 uuf, +100 -0%, 1000V
C4048 & C4049	0313 7070	1000 uuf, ± 20%
C4051 to C4057	0313 3410	composition, 0.39 uuf, ± 5%
C4061 to C4067	0313 3410	composition, 0.39 uuf, ± 5%
C4071 to C4077	0313 3410	composition, 0.39 uuf, ± 5%
		CAPACITORS (4100)
C4101 to C4152	0319 1072	variable, plastic, 0.7 - 3.5 uuf, 350V
C4161 to C4172	0313 3450	composition, 0.56 uuf, ± 5%
C4173 & C4174	0319 0400	electrolytic, 16 uf, +50 -10%, 450V
C4181 to C4192	0313 3450	composition, 0.56 uuf, ± 5%

Symbol	Part Number	Description
	DELAY LINES	
DL4000 & DL4001	2101 8211	inductor, plate line
DL4002 & DL4003	2101 8221	inductor, grid line
DL4004 to DL4007	2101 8231	inductor, signal, lower
DL4008 & DL4009	2101 8241	inductor, signal, upper
	ELECTRICAL CONNECTORS	
J3001 & J3002	0905 4840	jack, tip, white
J4001 & J4002	0905 4840	jack, tip, white
J4003	0905 6790	jack, tip, yellow
J4004	0905 6780	jack, tip, blue
	COILS	
L4000 & L4001	2101 8291	22 turns
L4100 & L4101	2101 7382	variable, 1.5 - 3 uh
	ELECTRICAL CONNECTORS	
P4001 & P4002	4101 0810	terminal, insulated feedthru

Symbol	Part Number	Description
	RESISTORS (4000)	
Notes: 1. All resistors are fixed, composition, ± 1%, and 1/2 watt unless otherwise specified.		
	2. Resistance values in ohms: K = thousand, M = million	
R4000	0239 0211	film, 590, 13W
R4001 & R4002	0229 4550	film, 590, 1/8W
R4003	0239 0212	film, 590, 13W
R4004	0203 3040	15, ± 5%, 1W
R4005 & R4006	0233 9540	film, 300, 2W
R4007	0239 1373	film, 1300, ± 5%, 2W
R4011 to R4017	0203 1610	47, ± 10%
R4021 to R4027	0239 1192	film, 1K, 1W
R4028	0239 1193	film, 970, 1W
R4031 to R4036	0203 1530	10, ± 10%
R4101 & R4102	0229 7780	film, 36K, ± 5%, 1/8W
	ELECTRON TUBES	
V401 to V407	2501 2380	6939
	NETWORKS	
Z4000 & Z4001 *	8800 2351	peaking coil, 12.5 turns
Z4101 to Z4104 *	8800 2351	peaking coil, 12.5 turns

* Wound on 4.7K Allen Bradley Resistor 0203 1850

PARTS LIST FOR MAIN SWEEP GENERATOR: X MODULE

Symbol	Part Number	Description
	CAPACITORS (5100)	
Notes: 1.	All capacitors are fixed, ceramic and 500V, unless otherwise specified.	
2.	GMC denotes Guaranteed Minimum Capacitance.	
C5100	0318 3720	plastic, 0.22 uf, + 20%, 400V
C5101 & C5102	0319 0310	0.04 uf, GMC, 600V
C5103	0315 1920	220 uuf, + 5%
C5104	0315 3250	10 uuf, ± .5 uuf
C5105	0318 0220	plastic, 0.22 uf, ± 20%, 150V
C5106	0319 4780	0.01 uf, GMC
C5107	0319 0310	0.04 uf, GMC, 600V
C5108	0319 4790	0.02 uf, GMC
C5109	0316 7410	22 uuf, ± 5%
C5110	0310 1270	1000 uuf, GMC, 1000V
C5111	0314 2590	36 uuf, + 5%
C5112	0319 4790	0.02 uf, GMC
C5113	0316 6600	300 uuf
C5120	0318 0220	plastic, 0.22 uf, ± 20%, 150V
C5121		
C5122	0318 0220	plastic, 0.22 uf, ± 20%, 150V
C5123	0316 7370	15 uuf, ± 5%
C5124 & C5125	0316 7410	22 uuf, + 5%
C5126	0312 2430	0.02 uf, + 100 -0%
C5127 & C5128	0310 1270	1000 uuf, GMC, 1000V
C5129		uuf, 1/2%
C5131	0319 4790	0.02 uf, GMC
C5132	0316 7430	24 uuf, + 5%
C5133	0326 4520	1000 uuf, GMC

Symbol	Part Number	Description
	CAPACITORS (5200)	
Notes: 1. All capacitors are fixed, ceramic and 500V, unless otherwise specified.		
	2. GMC denotes Guaranteed Minimum Capacitance.	
C5200	0318 0220	plastic, 0.22 uf, ±20%, 150V
C5201	0319 4780	0.01 uf, GMC
C5202	0314 2520	18 uuf, ±5%
C5204	0319 4790	0.02 uf, GMC
C5211	0316 7410	22 uuf, ±5%
C5212	0316 7470	47 uuf, ±5%
C5213	0319 4790	0.02 uf, GMC
C5214	0313 3060	100 uuf, ±20%
C5215	0319 4000	variable, plastic, 1-8 uuf, 350V
C5216	0319 9010	plastic, 0.1 uf, ±20%, 150V
C5217 & C5218	0319 4790	0.02 uf, GMC
C5219	0319 4780	0.01 uf, GMC
C5231 & C5232	0310 1270	1000 uuf, GMC, 1000V
C5233	0319 0590	plastic, 0.1 uf, ±20%, 200V
C5234	0318 3730	plastic, 0.022 uf, ±20%, 400V
C5235	0319 4790	0.02 uf, GMC
C5241	0312 2430	0.02 uf, +100 -0%
C5242	0312 6250	plastic, 0.47 uf, ±20%, 200V

PARTS LIST FOR MAIN SWEEP GENERATOR: X MODULE (Continued)

Symbol	Part Number	Description
	SEMICONDUCTORS	
CR5101	2600 1920	diode, silicon junction, 1N55A
CR5102 to CR5104	2600 6700	diode, 1N34A
CR5105	2600 1920	germanium, 30 ma dc, 1N55A
CR5200	2600 6500	germanium, 60 ma dc, 1N56A
	NEON LAMP	
E5200	1200 7171	glow, ST140
	COILS (fixed, unless otherwise specified)	
L5100	2100 6240	rf, 1 uh, ± 10%
L5101	2100 6280	rf, 2.2 uh, ± 10%
L5300	2102 0370	rf, 120 uh, ± 5%
L5600	2102 0430	rf, 470 uh, ± 5%
L5601	2102 0370	rf, 120 uh, ± 5%
	ELECTRICAL CONNECTORS	
P5000	0905 7330	plug, male, 24 contacts
P5100	0905 7330	plug, male, 24 contacts
P5200	0905 7330	plug, male, 24 contacts

Symbol	Part Number	Description
	RESISTORS (5100)	
Notes: 1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.		
	2. Resistance values in ohms: K = thousand M = million	
R5100	0203 0320	220
R5101	0203 1610	47, ± 10%
R5102	0203 0320	220
R5103	0229 3900	wire wound, 15K, ± 1%, 5W
R5104	0203 0590	3K
R5105 to R5107	0239 1416	film, 56K, 2W
R5108	0203 0480	1K
R5109	0228 7330	47, ± 20%, 1/4W
R5110	0203 3700	8200, 1W
R5111	0203 1580	27, ± 10%
R5112	0239 1188	film, 900, ± 1%, 1W
R5113	0203 3570	2400, 1W
R5114	0239 1187	film, 800, ± 1%, 1W
R5115 & R5116	0229 2680	film, 62K, ± .5%
R5117	0203 3700	8200, 1W
R5118	0239 1385	film, 3900, 2W
R5119	0239 1374	film, 1500, 2W
R5121 & R5122	0203 1580	27, ± 10%
R5123	0229 2700	film, 92K, ± .5%
R5124	0229 2730	film, 94K, ± .5%
R5125	0203 1580	27, ± 10%
R5126	0203 1040	220K
R5127	0203 1000	150K
R5128	0203 1610	47, ± 10%
R5129	0229 7290	film, 43,200, ± 1%
R5130	0229 7310	film, 100K, ± 1%
R5131	0203 1650	100, ± 10%
R5132	0203 0890	51K
R5133	0229 7280	film, 1K, ± 1%
R5134	0203 1580	27, ± 10%
R5135	0203 1690	220, ± 10%
R5136	0228 7330	47, ± 20%, 1/4W

Symbol	Part Number	Description
		RESISTORS (5100 continued)
Notes:	1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.	
	2. Resistance values in ohms: K = thousand, M = million	
R5138	0239 0406	film, 133K, ± 1%
R5139	0229 3900	wire wound, 15K, ± 1%, 5W
R5141	0203 1650	100, ± 10%
R5142	0203 0840	33K
R5143	0203 0760	15K
R5151	0239 0353	film, 162K, ± 1%
R5152	0203 0750	13K
R5153	0108 4840	variable, wire wound, 50K, ± 10%, 2W
R5154	0229 7370	film, 750K, ± 1%
R5156	0203 0520	1500
R5157	0228 7330	47, ± 20%, 1/4W
R5158	0203 3890	51K, 1W
R5161	0239 0352	film, 150K, ± 1%
R5162	0230 1760	film, 26K, 5W
R5163	0203 0320	220
R5164	0229 7360	film, 576K, ± 1%
R5165	0239 1396	film, 10K, 2W
R5166	0203 0930	75K
R5167	0229 7330	film, 150K, ± 1%
R5168	0203 0990	130K
R5169	0203 0720	10K
R5171	0228 7330	47, ± 20%, 1/4W
R5172	0203 0560	2200
R5173	0203 0350	300
R5174	0228 7330	47, ± 20%, 1/4W
R5175	0203 0650	5100

Symbol	Part Number	Description
	RESISTORS (5100 continued)	
Notes:	1. All resistors are fixed, composition, ±5%, and 1/2 watt unless otherwise specified.	
	2. Resistance values in ohms: K = thousand, M = million	
R5176	0203 0960	100K
R5177	0203 1610	47, ±10%
R5178	0203 1070	300K
R5179	0203 0930	75K
R5181	0203 0600	330Ω
R5182	0239 1195	film, 69,800, ±1%, 1W
R5183	0239 1196	film, 47,500, ±1%, 1W
R5184	0203 0760	15K
R5185	0203 0410	510
R5186	0204 2300	91M, ±20%
	RESISTORS (5200)	
R5200	0203 1580	27, ±10%
R5201	0229 6910	film, 47,500, ±1%, 1/4W
R5202	0203 1610	47, ±10%
R5203	0229 6880	film, 15K, ±1%, 1/4W
R5204	0203 3680	6800, 1W
R5205	0239 1197	film, 140K, ±1%, 1W
R5206	0229 6920	film, 60,400, ±1%, 1/4W
R5207	0204 1510	20M
R5208	0203 1610	47, ±10%
R5209	0203 0650	5100
R5211	0203 0400	470

Symbol	Part Number	Description
		RESISTORS (5200 continued)
Notes:	1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.	
	2. Resistance values in ohms: K = thousand, M = million	
R5221	0203 3690	7500, 1W
R5222	0108 5100	variable, wire wound, 10K/10K, ± 10%, 2W
R5223	0203 0720	10K
R5224	0229 2680	film, 62K, ± .5%
R5225	0229 2710	film, 102K, ± .5%
R5226	0203 1610	47, ± 10%
R5227	0203 0000	10
R5231	0203 3560	2200, 1W
R5232	0203 0320	220
R5233	0203 1690	220, ± 10%
R5234	0203 3740	12K, 1W
R5235	0229 4950	film, 2M, ± 1%
R5236	0203 0390	430
R5237	0229 7340	film, 249K, ± 1%
R5238	0203 1610	47, ± 10%
R5239	0239 1185	film, 750, ± 1%, 1W
R5241	0203 0240	100
R5251	0203 1610	47, ± 10%
R5252	0203 1170	750K
R5253	0203 1610	47, ± 10%
R5254	0203 1170	750K
R5255	0203 1510	20M
R5256	0203 0900	56K
R5257	0203 0860	39K
R5258	0239 0842	film, 825K, ± 1%, 1/2W
R5259	0229 6960	film, 392K, ± 1%, 1/4W
R5261	0204 2300	91M, ± 20%
R5262	0203 1610	47, ± 10%

PARTS LIST FOR MAIN SWEEP GENERATOR: X MODULE (Concluded)

Symbol	Part Number	Description
	RESISTORS (5200 concluded)	

Notes: 1. All resistors are fixed, composition, ±5%, and 1/2 watt unless otherwise specified.

2. Resistance values in ohms: K = thousand
M = million

R5263	0203 0800	22K
R5264	0228 7330	47, ±20%, 1/4W
R5265	0203 1610	47, ±10%
R5271	0239 1409	film, 33K, 2W
R5272	0228 8380	film, 10M, ±1%
R5273	0229 5000	film, 4.75M, ±1%
R5274	0203 1330	3.6M
R5275	0203 1770	1K, ±10%

PARTS LIST FOR Z-AXIS CIRCUIT: X MODULE

Symbol	Part Number	Description
	CAPACITORS (5300)	
Notes: 1. All capacitors are fixed, ceramic and 500V, unless otherwise specified.		
	2. GMC denotes Guaranteed Minimum Capacitance.	
C5300	0310 1270	1000 uuf, +100 -0%, 1000V
C5301	0316 7400	20 uuf, ±5%
C5302	0310 1270	1000 uuf, +100 -0%, 1000V
C5303 & C5304	0316 7370	15 uuf
C5305	0318 0220	plastic, 0.22 uf, ±20%, 150V
C5311 & C5312	0316 7400	20 uuf
C5313	0326 4640	0.01 uf, GMC
C5314	0318 3760	plastic, 0.47 uf, ±20%, 400V
C5315	0326 4640	0.01 uf, GMC
C5316	0316 7460	33 uuf
C5317	0316 7400	20 uuf
C5318	0316 7370	15 uuf
	CAPACITORS (5400)	
C5400	0319 0310	0.04 uf, GMC, 600V
C5403	0319 0310	0.04 uf, GMC, 600V
C5404	0315 1920	220 uuf
C5405	0315 2000	100 uuf, ±20%
C5406	0319 4780	0.01 uf
C5407	0315 2000	100 uuf, ±20%
C5408	0310 1270	1000 uuf, GMC, 1000V
C5409	0319 9110	100 uuf, ±10%
C5411	0316 6500	100 uuf, ±10%
C5412	0310 1270	1000 uuf, +100 -0%, 1000V
C5413	0319 0310	0.04 uf, GMC, 600V

PARTS LIST FOR Z-AXIS CIRCUIT: X MODULE (Continued)

Symbol	Part Number	Description
	SEMICONDUCTORS	
CR5300 to CR5303	2600 1920	germanium, 30 ma dc, 1N55A
CR5401 to CR5406	2600 1920	germanuum 30 ma dc, 1N55A
CR5408	2600 1920	germanium, 30 ma dc, 1N55A
	NEON LAMP	
E5400	1200 7171	glow, ST140

PARTS LIST FOR Z-AXIS CIRCUIT: X MODULE (Continued)

Symbol	Part Number	Description
	RESISTORS (5300)	
Notes:	1. All resistors are fixed, composition, ±5%, and 1/2 watt unless otherwise specified.	
	2. Resistance values in ohms: K = thousand, M = million	
R5300	0203 1280	2.2M
R5301	0203 0640	4700
R5302	0203 1020	180K
R5303	0228 7330	47, ±20%, 1/4W
R5304	0239 1392	film, 6800, 2W
R5305	0239 1382	film, 3K, 2W
R5306	0228 7330	47, ±20%, 1/4W
R5307	0203 0910	62K
R5308	0203 0820	27K
R5309	0203 0560	2200
R5311	0203 3890	51K, 1W
R5312	0203 0740	12K
R5313	0203 3910	62K, 1W
R5314	0203 4060	270K, 1W
R5321	0203 1650	100, ±10%
R5322	0203 3800	22K, 1W
R5323	0203 1610	47, ±10%
R5324	0203 0920	68K
R5325 & R5326	0239 1391	film, 6200, 2W
R5327	0203 1610	47, ±10%
R5328	0203 0920	68K
R5329	0203 3800	22K, 1W
R5341 & R5342	0228 7330	47, ±20%, 1/4W
R5343	0203 1690	220, ±10%
R5344 to R5349	0239 1417	film, 62K, 2W
R5351	0203 0520	1500
R5352	0203 0650	5100
R5353	0203 0460	820

PARTS LIST FOR Z-AXIS CIRCUIT: X MODULE (Concluded)

Symbol	Part Number	Description
	RESISTORS (5400)	
Notes: 1. All resistors are fixed, composition, ±5%, and 1/2 watt unless otherwise specified.		
	2. Resistance values in ohms: K = thousand, M = million	
R5400	0203 1730	470, ±10%
R5401	0203 1650	100, ±10%
R5402	0239 1416	film, 56K, 2W
R5411	0203 0430	470
R5412	0203 3410	510, 1W
R5413	0203 1610	47, ±10%
R5414 & R5415	0239 1416	film, 56K, 2W
R5416	0228 7330	47, ±20%, 1/4W
R5417	0203 3640	4700, 1W
R5421	0203 1610	47, ±10%
R5422	0203 1170	750K
R5423	0203 3640	4700, 1W
R5424	0203 1170	750K
R5425	0228 7330	47, ±20%, 1/4W
R5426 & R5427	0239 1416	film, 56K, 2W
R5428	0203 1610	47, ±10%
R5431	0239 1387	film, 4700, 2W
R5432	0229 6930	film, 121K, ±1%, 1/4W
R5433	0229 6890	film, 16,200, ±1%, 1/4W
R5434	0203 1610	47, ±10%
R5435	0203 3480	1K, 1W
R5436	0203 1650	100, ±10%

PARTS LIST FOR X-AXIS CIRCUIT: X MODULE

Symbol	Part Number	Description
	CAPACITORS (5500)	
Notes: 1. All capacitors are fixed, ceramic and 500V, unless otherwise specified.		
	2. GMC denotes Guaranteed Minimum Capacitance.	
C5500 & C5501	0316 7400	20 uuf
C5502	0310 1270	1000 uuf, GMC, 1000V
C5503	0319 0310	0.04 uf, GMC, 600V
C5504	0315 2000	100 uuf, +20%
C5505	0318 0270	plastic, 0.1 uf, ±20%, 150V
C5506	0316 6690	620 uuf, +10%
C5507	0312 2430	0.02 uf, +100 -0%
C5508	0319 4790	0.02 uf, GMC
C5509	0312 2430	0.02 uf, +100 -0%
C5510	0319 0630	plastic, 0.22 uf, ±20%, 200V
C5511	0319 4780	0.01 uf, GMC
C5512	0312 2430	0.02 uf, +100 -0%
	CAPACITORS (5600)	
C5600 & C5601	0312 2430	0.02 uf, +100 -0%
C5602	0319 1072	variable, 0.7.3 uuf
C5603	0319 9310	3 uuf, +0.25 uuf
C5604	0319 9320	25 uuf, ± 1 uuf
C5605	0319 4000	variable, plastic, 1-8 uuf, 350V
C5606	0310 1270	1000 uuf, +100 -0%, 1000V
C5607	0315 3250	10 uuf, ± 0.5 uuf
C5610	0310 1270	1000 uuf, 1000V
C5621 & C5622	0319 4790	0.02 uf, GMC
C5623	0313 7070	1000 uuf, +20%
C5624	0316 7110	2.2 uuf, +0.25 uuf
C5625	0310 1270	1000 uuf, GMC, 1000V
C5626	0319 4790	0.02 uf, GMC

PARTS LIST FOR X-AXIS CIRCUIT: X MODULE (Continued)

Symbol	Part Number	Description
	CAPACITORS (5600 concluded)	
Notes: 1. All capacitors are fixed, ceramic and 500V, unless otherwise specified.		
	2. GMC denotes Guaranteed Minimum Capacitance.	
C5628	0300 7790	variable, 1.5-7 uuf
C5629	0316 7110	2.2 uuf, ± 0.25 uuf
C5631	0319 4780	0.01 uf, GMC
	SEMICONDUCTORS	
CR5500	2600 1920	germanium, 30 ma dc, 1N55A
CR5501	2600 6680	crystal, 1N55A
CR5502	2600 1920	germanium, 30 ma dc, 1N55A
	NEON LAMP	
E5500	1200 7171	glow, ST140
	ELECTRICAL CONNECTORS	
J5600	0905 6770	jack, tip, green
J5601	0905 6800	jack, tip, red
	RELAY	
K5600	0501 5331	DPDT, 110V DC operation

PARTS LIST FOR X-AXIS CIRCUIT: X MODULE (Continued)

Symbol	Part Number	Description
	RESISTORS (5500)	
Notes: 1. All resistors are fixed, composition, ±5%, and 1/2 watt unless otherwise specified.		
	2. Resistance values in ohms: K = thousand, M = million	
R5500 & R5501	0203 3800	22K, 1W
R5502 & R5503	0203 3920	68K, 1W
R5504 & R5505	0203 1610	47, ±10%
R5506 & R5507 & R5508	0228 7330	47, ±20%, 1/4W
	0239 1411	film, 36K, 2W
R5509	0228 7330	47, ±20%, 1/4W
R5511	0203 0480	1K
R5512 & R5513	0203 1170	750K
R5514	0203 1610	47, ±10%
R5515	0203 0430	470
R5516	0203 3410	510, 1W
R5517	0228 7330	47, ±20%, 1/4W
R5518	0203 1650	100, ±10%
R5519	0229 6940	film, 150K, ±1%, 1/4W
R5521	0229 6980	film, 15K, ±1%, 1/4W
R5522	0203 1650	100, ±10%
R5523	0239 1185	film, 750, ±1%, 1W
R5524	0228 7330	47, ±20%, 1/4W
R5525	0210 6220	wire wound, 12K, 10W
R5526	0203 0300	180
R5527	0228 7330	47, ±20%, 1/4W
R5528	0239 1412	film, 39K, 2W
R5529	0229 6930	film, 121K, ±1%, 1/4W
R5531	0203 1610	47, ±10%
R5532	0239 0837	film, 562K, ±1%, 1/2W
R5533	0229 6950	film, 274K, ±1%, 1/4W

Symbol	Part Number	Description
	RESISTORS (5600)	
Notes: 1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.		
	2. Resistance values in ohms: K = thousand, M = million	
R5600	0203 0720	10K
R5601	0203 0900	56K
R5602	0229 7300	film, 51,100, ± 1%
R5603	0203 1610	47, ± 10%
R5604	0229 6990	film, 43,700, ± 1%, 1/4W
R5605	0203 3840	33K, 1W
R5606	0228 7330	47, ± 20%, 1/4W
R5607	0224 3020	film, 4.6M, ± 1%
R5608	0228 8390	film, 24.9M, ± 1%
R5609	0229 4960	film, 4.02M, ± 1%
R5611	0224 4230	film, 750K, ± 1%
R5612	0203 1510	20M
R5613	0204 1550	20M, ± 10%
R5614	0203 1310	3M
R5615	0229 4960	film, 4.02M, ± 1%
R5616 & R5617	0108 5000	variable, 50K, ± 20%
R5618	0203 0920	68K
R5619	0229 4980	film, 1.6M, ± 1%
R5621	0204 1510	20M
R5622	0204 2870	9.1M, ± 20%
R5628	0203 1610	47, ± 10%
R5629 & R5630	0203 0640	4700
R5631	0228 7330	47, ± 20%, 1/4W
R5632	0229 0850	film, 6200, 17W
R5633	0203 1610	47, ± 10%
R5634	0228 8370	film, 7.5M, ± 1%
R5635	0203 1580	27, ± 10%
R5636	0239 1404	film, 20K, 2W
R5637	0203 1610	47, ± 10%
R5638	0204 1160	680K

PARTS LIST FOR X-AXIS CIRCUIT: X MODULE (Concluded)

Symbol	Part Number	Description
	RESISTORS (5600 concluded)	
Notes:	1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.	
	2. Resistance values in ohms: K = thousand, M = million	
R5639	0203 1200	1M
R5641	0203 0320	220
R5642	0203 1610	47, ± 10%
R5643	0203 0990	130K
R5644	0203 0800	22K
R5646	0230 1090	film, 1200
R5647	0229 0840	film, 3900, 17W
R5648	0203 1030	200K
R5649	0203 0640	4700
R5651	0239 1198	392K, ± 1%, 1W
R5652	0239 1208	film, 332K, ± 1%, 1W
R5653	0239 1207	film, 113K, ± 1%, 1W
R5654	0203 0560	220Ω
R5655	0203 1610	47, ± 10%

PARTS LIST FOR ELECTRON TUBES AND MISCELLANEOUS ITEMS: X MODULE

Symbol	Part Number	Description

CAPACITORS (5800)

Notes: 1. All capacitors are fixed, ceramic, 1000 uuf, and 500V unless otherwise specified.

2. GMC denotes Guaranteed Minimum Capacitance.

C5800 to C5808	0319 0350	GMC

RESISTORS (5800)

Notes: 1. All resistors are fixed, wire wound and 1/2W.

2. Resistance values in ohms: K = thousand
M = million

R5800	0211 4850	1.3, ± 5%
R5801 to R5804	0210 0810	4.7, ± 10%

PARTS LIST FOR ELECTRON TUBES AND MISCELLANEOUS ITEMS: X MODULE (Concluded)

Symbol	Part Number	Description
	ELECTRON TUBES	
	MAIN SWEEP GENERATOR	
V501	2501 1760	E88CC/6922
V502	2500 8250	6BC7
V503 & V504	2501 1930	6BA8-A
V505	2501 2200	7119/E182CC
V506 to V508	2501 1760	E88CC/6922
V509 & V510	2501 1930	6BA8-A
V511	2500 9270	OG3/85A2
V512	2501 1930	6BA8-A
V513	2501 1980	6BR8-A
	Z-AXIS CIRCUIT	
V514	2501 2220	6DJ8/ECC88
V515	2501 1760	E88CC/6922
V516	2501 1540	6BK7B
V518 & V519	2501 1930	6BA8-A
V520	2501 1990	6AW8-A
	X-AXIS CIRCUIT	
V521 & V522	2501 1930	6BA8-A
V523	2501 1970	6BJ8
V524	2501 1990	6AW8-A
V525	2501 2200	7119/E182CC
V526	2500 9270	OG3/85A2
V527	2501 2220	6DJ8/ECC88
V528	2501 1760	E88CC/6922
V529	2501 1800	6BQ5/EL84
V530	2501 2400	6CW5/EL86

PARTS LIST FOR MASTER CLOCK: MAIN FRAME MODULE

Symbol	Part Number	Description
	CAPACITORS (6000)	
Note: All capacitors are fixed, ceramic, unless otherwise specified.		
C6000	0319 4790	0.02 uf, 500V
C6002	0318 0270	plastic, 0.01 uf, ±20%, 150V
C6004	0319 0310	0.04 uf, 600V
C6006	0319 9410	62 uuf, ±5%, 500V
C6008	0319 4790	0.02 uf, 500V
C6009	0319 9410	62 uuf, ±5%, 500V
C6011 & C6012	0326 4640	0.01 uf, +100 -0%, 500V
	SEMICONDUCTORS	
CR6000 & CR6001	2600 6490	1N34A, germanium, 50 ma dc
CR6004	2600 6490	1N34A, germanium, 50 ma dc
CR6005 & CR6006	2600 1920	1N55A, germanium, 30 ma dc
CR6007	2600 6490	1N34A, germanium, 50 ma dc
CR6008 & CR6009	2600 6500	1N56A, germanium, 60 ma dc
	RESISTORS (6000)	
Notes: 1. All resistors are fixed, composition, ±5%, and 1/2 watt unless otherwise specified.		
2. Resistance values in ohms: K = thousand, M = million		
R6000	0203 1130	510K
R6001	0203 0640	470Ω
R6004	0203 1010	160K
R6005	0203 1730	470, +10%
R6006 to R6008	0239 1399	film, 13K, 2W
R6009	0203 0320	220

Symbol	Part Number	Description
	RESISTORS (6000)	
Notes: 1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.		
	2. Resistance values in ohms: K = thousand, M = million	
R6011 & R6012	0203 3870	43K, 1W
R6013	0228 7260	47, ± 10%, 1/4W
R6014	0203 0580	270Ω
R6015	0203 0860	39K
R6016 to R6018	0239 1399	film, 13K, 2W
R6019	0228 7260	47, ± 10%, 1/4W
R6021	0203 1010	160K
R6022	0203 0320	220
R6023	0228 7260	47, ± 10%, 1/4W
R6024	0203 3480	1K, 1W
R6025 & R6026	0229 8650	wire wound, 15K, ± 3%, 10W
R6027	0203 3480	1K, 1W
R6028	0203 3410	510, 1W
R6029	0228 7330	47, ± 20%, 1/4W
	ELECTRON TUBES	
V601	2501 1760	E88CC/6922
V602	2501 2200	7119/E182CC

Symbol	Part Number	Description
	CAPACITORS (6100)	
Note: All capacitors are fixed, ceramic, and 500V unless otherwise specified.		
C6100	0326 4640	0.01 uf
C6101	0319 1040	4.7 uuf
C6102	0326 4520	1000 uuf
C6103	0300 3070	variable, 4-30 uuf
C6104	0319 1050	0.02 uf, 250V
C6105	0317 0090	100 uuf
C6106 & C6107	0326 4520	1000 uuf
C6108	0318 0220	plastic, 0.22 uf, ±20%, 150V
C6109 & C6110	0326 4660	plastic, 0.02 uf
C6111	0319 0630	plastic, 0.22 uf, ±20%, 200V
C6112	0315 3190	5.6 uuf
C6113	0319 4790	0.02 uf
C6114	0312 9380	mica, 2700 uuf
C6115	0319 0590	plastic, 0.1 uf, ±20%, 200V
C6116	0318 0260	plastic, 0.022 uf, 150V
C6117 & C6118	0319 5750	62 uuf
C6119	0326 4520	1000 uuf
C6120	0319 9010	plastic, 0.1 uf, ±20%, 150V
C6121 & C6122	0319 4680	0.01 uf
C6123	0315 3190	5.6 uuf, 600V
C6124	0326 4660	plastic, 0.02 uf
C6130	0326 4520	1000 uuf
	SEMICONDUCTORS	
CR6100 to CR6102	2600 6500	1N56A, germanium, 60 ma dc
	COILS (fixed, unless otherwise specified)	
L6100	2102 0680	rf, 22 uh, ±10%
L6101	2102 0640	rf, 10 uh, ±10%
L6102	2102 0660	rf, 15 uh, ±5%
L6103	2102 0710	rf, 82 uh, ±5%

PARTS LIST FOR SYNC AMPLIFIER: MAIN FRAME MODULE
(Continued)

Symbol	Part Number	Description
	RESISTORS (6100)	
Notes:	1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.	
	2. Resistance values in ohms: K = thousand, M = million	
R6100 to R6102	0239 0337	film, 43.2K, ± 1%
R6103	0239 0342	film, 61.9K, ± 1%
R6106	0203 2170	2.2M, ± 10%
R6107	0203 2040	180K, ± 10%
R6108	0203 0930	75K
R6109	0203 1530	10, ± 10%
R6110	0234 0210	film, 110K, ± 1%, 1/4W
R6111	0229 5040	film, 909K, ± 1%
R6112	0203 0480	1K
R6113	0203 1610	47, ± 10%
R6114	0203 0640	4700
R6115	0239 0361	film, 475K, ± 1%
R6116	0239 0313	film, 200K, ± 1%
R6117	0203 2090	470K, ± 10%
R6118	0229 4990	film, 1M, ± 1%
R6119 & R6120	0203 1650	100, ± 10%
R6121	0203 0590	3K
R6122	0227 8740	wire wound, 15K, 5W
R6123	0239 1406	film, 24K, 2W
R6124	0203 0240	100
R6125	0108 4800	variable, wire wound, 10K, ± 10%, 2W
R6126	0239 1409	film, 33K, 2W
R6127	0234 3550	film, 4.99K, ± 1%
R6128	0234 3820	film, 475, ± 1%
R6129	0210 0810	wire wound, 4.7, ± 10%
R6130	0228 7300	130, 1/4W
R6131 & R6132	0203 1610	47, ± 10%

Symbol	Part Number	Description
	RESISTORS (6100)	

Notes: 1. All resistors are fixed, composition, ± 5% and 1/2 watt unless otherwise specified.

2. Resistance values in ohms: K = thousand
M = million

R6133 & R6134	0203 0880	47K
R6135	0203 0860	39K
R6136	0203 3830	30K, 1W
R6137	0234 3710	film, 110K, ± 1%
R6138	0234 3630	film, 20K, ± 1%
R6139	0107 1991	variable, 50K, ± 10%
R6140	0203 0400	470
R6141	0234 3660	film, 39.2K, ± 1%
R6142	0203 1650	100, ± 10%
R6143	0203 0160	47
R6144	0229 7640	film, 750, ± 1%
R6145	0203 2190	3.3M, ± 10%
R6146	0203 1580	27, ± 10%
R6147	0234 3670	film, 47.5K, ± 1%
R6148	0239 1199	film, 130, ± 1%, 1W
R6149	0203 1200	1M
R6150	0203 3820	27K, 1W
R6151	0203 1510	20M
R6152	0203 0930	75K
R6153	0105 5670	variable, 50K, ± 10%
R6154	0239 1201	film, 274K, ± 1%, 1W
R6155	0203 0480	1K
R6156	0203 1580	27, ± 10%
R6157	0239 1192	film, 1K, ± 1%, 1W
R6158	0203 1020	180K
R6159	0203 1440	10M
R6161	0203 0240	100
R6162	0203 1050	270K
R6163	0203 1890	10K, ± 10%
R6164	0203 3880	47K, 1W

Symbol	Part Number	Description
	RESISTORS (6100)	
Notes:	1. All resistors are fixed, composition, ± 5% and 1/2 watt unless otherwise specified.	
	2. Resistance values in ohms: K = thousand, M = million	
R6165	0203 1610	47, ± 10%, 1/2W
R6166	0234 3670	film, 47.5K, ± 1%
R6167	0108 4800	variable, wire wound, 10K, ± 10%, 2W
R6168	0234 3570	film, 10K, ± 1%
R6169	0229 7310	film, 100K, ± 1%
R6170	0239 0302	film, 3740, ± 1%
R6172	0229 7520	film, 432K, ± 1%
R6173	0229 7490	film, 301K, ± 1%
R6174	0203 1610	47, ± 10%, 1/2W
R6175	0239 1405	film, 22K, 2W
R6176	0203 0320	220
R6177	0239 0345	film, 90.9K, ± 1%
R6178	0203 0320	220
	ELECTRON TUBES	
V610 to V612	2501 1760	E88CC/6922
V613 & V614	2501 1930	6BA8A

PARTS LIST FOR SWEEP RATE SWITCH: MAIN FRAME MODULE

Symbol	Part Number	Description
	CAPACITORS (6400)	
Note: All capacitors are fixed, ceramic and 500V unless otherwise specified.		
C6400 to C6403	0326 4520	1000 uuf
C6411	0317 0090	100 uuf
C6412	0319 5850	27 uuf
C6413	0311 4930	470 uuf
C6414	0326 4620	5000 uuf
C6415	0318 0240	plastic, 0.047 uf, ±20%, 150V
C6421	0319 1195	mica, 476, ± 1%
C6422	0319 1194	mica, 446, ± 1%
C6423	0319 1196	mica, 4946, ± 1%
C6424 & C6425	0319 1197	mica, 0.025 uf, ± 1%, 300V
C6426 A,B	0319 1121	plastic, 2 x 1 uf, ± 1%, 200V
	RESISTORS (6400)	
Notes: 1. All resistors are fixed, composition, ±5% and 1/2 watt unless otherwise specified.		
2. Resistance values in ohms: K = thousand M = million		
R6400	0203 0480	1K
R6401	0203 0410	510
R6402	0203 0340	270
R6403	0203 0190	62
R6404	0203 0120	33
R6405	0203 0070	20
R6406	0203 3920	68K, 1W
R6411	0203 0940	82K
R6412	0203 0910	62K
R6413	0239 0301	film, 2.49K, ± 1%
R6414	0239 0385	film, 10.5K, ± 1%
R6415 to R6420	0228 7280	1M, ± 10%, 1/4W

PARTS LIST FOR SWEEP RATE SWITCH: MAIN FRAME MODULE
(Concluded)

Symbol	Part Number	Description
	RESISTORS (6400)	

Notes: 1. All resistors are fixed, composition, ±5% and 1/2 watt unless otherwise specified.

2. Resistance values in ohms: K = thousand
M = million

R6421	0233 9900	wire wound, 48.25K
R6422	0229 8860	wire wound, 24.1K, +0.25%, 7W
R6423	0229 8850	wire wound, 24K, ±0.25%, 7W
R6424	0228 8330	film, 12.8M, +1%
R6425	0228 8340	film, 6.4M, ±1%
R6426	0228 8350	film, 1.28M
R6427	0228 8290	film, 2.56M
R6428	0228 8350	film, 1.28M
R6429	0234 0450	film, 256K, +1%
R6430	0234 0460	film, 512K, ±1%
R6431	0234 0450	film, 256K, +1%
R6432	0234 0440	film, 160K, ±1%

PARTS LIST FOR DISPLAY LOGIC SWITCH, SCALE LAMPS AND FAN

Symbol	Part Number	Description
B6600	8100 4431	motor, dc, 60-cycle operation
-----	8100 5380	fan blade
B6601	8100 4281	motor, ac, 50-cycle operation
----	8100 4421	fan blade

CAPACITORS

Note: All capacitors are fixed, ceramic, and 500V unless otherwise specified.

C5621	0316 7330	10 uuf, ± 5%
C6522	0326 4520	1000 uuf
C6523	0326 4640	0.01 uf
C6600	0319 9780	electrolytic, 40 uf, 250V
C6601	0326 4660	0.02 uf

LAMPS

DS6521 to DS6524	1201 0960	incandescent, miniature bayonet, .16 ampere (Illuminated Scale)

RESISTORS (6500)

Notes: 1. All resistors are fixed, composition, ± 5%, and 1/2 watt unless otherwise specified.

2. Resistance values in ohms: K = thousand
M = million

R6500	0239 0379	film, 215K, ± 1%
R6501	0239 0336	film, 39.2K, ± 1%
R6502 & R6503	0105 5680	variable, 100K, ± 10%
R6504	0239 0365	film, 249K, ± 1%
R6505	0239 0386	film, 169K, ± 1%
R6506	0227 8740	wire wound, 15K, 5W
R6507	0203 1100	390K
R6508	0203 0930	75K
R6509	0203 0880	47K
R6511	0203 0810	24K
R6520	0203 0560	2200
R6521	0203 0580	2700
R6522	0227 8740	wire wound, 15K, 5W
R6523	0203 0840	33K
R6524	0203 0980	120K
R6525	0203 0320	220

PARTS LIST FOR READOUT GENERATOR: MAIN FRAME MODULE

Symbol	Part Number	Description
	CAPACITORS (7000)	
Note: All capacitors are fixed, ceramic, and 500V unless otherwise specified.		
C7001	0301 3300	electrolytic, 20 uf, 150V
C7002	0312 2430	0.02 uf,
C7003	0319 9010	plastic, 0.1 uf, +20%, 150V
C7004	0317 5250	mica, 75 uuf, ±5%
C7005	0301 4580	15 uuf, ±5%
C7006	0318 0220	plastic, 0.22 uf, ±20%, 150V
C7007	0312 2430	0.02 uf
C7008 & C7009	0319 9210	22 uuf
C7010	0312 2430	0.02 uf
C7011	0319 0590	plastic, 0.1 uf, ±20%, 200V
C7012	0317 2270	2.2 uuf
C7020	0312 2430	0.02 uf
C7021	0326 4520	1000 uuf
	CAPACITORS (7100)	
C7101	0312 2430	0.02 uf
C7102 & C7103	0318 0260	plastic, 0.022 uf, ±20%, 150V
C7104	0319 5860	30 uuf, +5%
C7105	0316 7400	20 uuf, ∓5%
C7106	0318 0220	plastic, 0.22 uf, ±20%, 150V
C7107	0317 2270	2.2 uuf
C7108	0318 0220	plastic, 0.22 uf, +20%, 150V
C7109	0318 0260	plastic, 0.022 uf, ±20%, 150V
	RELAYS	
K7001 & K7002	0503 1460	armature

Symbol	Part Number	Description
	RESISTORS (7000)	
Notes: 1. All resistors are fixed, composition, ± 5% and 1/2 watt unless otherwise specified.		
	2. Resistance values in ohms: K = thousand M = million	
R7001	0203 1650	100, ± 10%
R7002	0239 1383	film, 3300, 2W
R7003	0203 0990	130K
R7004	0203 3570	2400, 1W
R7005 & R7006	0203 1610	47, ± 10%
R7007	0203 1120	470K
R7008	0203 1060	270K
R7009	0203 1580	27, ± 10%
R7010	0203 1610	47, ± 10%
R7011	0239 1397	film, 11K, 2W
R7012	0203 1580	27, ± 10%
R7013	0203 1690	220, ± 10%
R7014	0239 1409	film, 33K, 2W
R7015	0239 1414	film, 47K, 2W
R7016 & R7017	0203 1110	430K
R7018 to R7020	0203 1610	47, ± 10%
R7021 to R7024	0203 0980	120K
R7025	0239 1387	film, 4700, 2W
R7026	0203 1690	220, ± 10%
R7027	0203 1950	33K, ± 10%
R7028	0229 2670	film, 25K, ± 0.5%
R7029	0105 5670	variable, 50K, ± 10%
R7030	0228 7280	1M, ± 10%, 1/4W
R7031	0234 3870	film, 698K, ± 1%
R7032	0234 3620	film, 19.1K, ± 1%
R7033	0234 3640	film, 25.5K, ± 1%
R7034	0239 0846	film, 1.21M, ± 1%
R7035	0239 0857	film, 3.16M, ± 1%
R7036	0229 6740	film, 62.5K, ± 0.5%
R7037	0234 0430	film, 7600, ± 0.5%

Symbol	Part Number	Description
	RESISTORS (7000)	
Notes: 1. All resistors are fixed, composition, ± 5% and 1/2 watt unless otherwise specified.		
	2. Resistance values in ohms: K = thousand M = million	
R7038	0204 1350	4.3M
R7039	0203 1140	560K
R7040	0107 1871	variable, 300K/300K
R7041	0203 1140	560K
R7042	0204 1110	430K
R7043 & R7044	0239 1416	film, 56K, 2W
R7045	0204 1350	4.3M
R7046	0204 1110	430K
R7047 & R7048	0203 1690	220, ± 10%
R7049	0203 1610	47, ± 10%
R7050	0203 1220	1.2M
R7051 & R7052	0203 0820	27K
R7053	0203 1610	47, ± 10%
	RESISTORS (7100)	
R7101	0203 0720	10K
R7102	0203 3790	20K, 1W
R7103	0203 1200	1M
R7104	0203 3790	20K 1W
R7105	0203 0580	2700
R7106	0203 1440	10M
R7107	0203 1690	220, ± 10%
R7108	0203 0760	15K
R7109	0203 0910	62K
R7111	0234 3860	film, 562K, ± 1%
R7112	0239 1429	film, 180K, 2W
R7113	0107 2041	variable, wire wound, 50/2K, 2W
R7114	0203 1690	220, ± 10%
R7115	0203 1610	47, ± 10%

Symbol	Part Number	Description
	RESISTORS (7100)	
Notes:	1. All resistors are fixed, composition, ± 5% and 1/2 watt unless otherwise specified.	
	2. Resistance values in ohms: K = thousand, M = million	
R7118	0203 1440	10M
R7119	0228 8380	film, 10M, ± 1%
R7120	0229 8540	wire wound, 20K, ± 3%, 3W
R7121	0234 3580	film, 11K, ± 1%
R7122	0229 8540	wire wound, 20K, ± 3%, 3W
R7123	0229 7660	film, 2.21K, ± 1%
R7124	0204 1200	1M
R7125	0234 3700	film, 82.5K, ± 1%
R7126	0234 3650	film, 33.2K, ± 1%
R7127	0105 5670	variable, 50K, ± 10%
R7128	0234 3780	film, 267K, ± 1%
R7129	0204 1280	2.2M
R7131	0203 1690	220, ± 10%
R7132	0203 1610	47, ± 10%
R7133	0230 2270	film, 18K, 7W
R7134	0203 1370	5.1M
R7135	0203 1610	47, ± 10%
R7136	0203 1690	220, ± 10%
R7137	0239 1417	film, 62K, 2W
R7138	0234 3790	film, 392K, ± 1%
R7139	0234 0410	film, 19.1K, ± 0.5%
R7141	0234 0420	film, 25.5K, ± 0.5%
R7142	0234 8400	film, 15.15K, ± 0.5%
R7144	0234 3600	film, 13.7K, ± 1%
R7145	0203 1510	20M
R7146	0203 0740	12K
R7147	0203 1240	1.5M
R7148	0228 8380	10M, ± 1%
R7149	0234 3680	film, 69.8K, ± 1%

PARTS LIST FOR READOUT GENERATOR: MAIN FRAME MODULE
(Concluded)

Symbol	Part Number	Description
	ELECTRON TUBES	
V701	2501 1760	E88CC/6922
V702	2500 8250	6BC7
V703	2501 1760	E88CC/6922
V704 & V705	2500 8250	6BC7
V706 & V707	2501 1760	E88CC/6922
V708	2501 1540	6BK7B

PARTS LIST FOR HORIZONTAL & VERTICAL READOUT SWITCHES: MAIN FRAME MODULE

Symbol	Part Number	Description
	RESISTORS (7200)	

Notes: 1. All resistors are fixed, film, ± 1%, 1/8 watt unless otherwise specified.

2. Resistance values in ohms: K = thousand

R7201 & R7202	0239 0201 *	25K
R7204 to R7209	0239 0201 *	25K
R7211 to R7219	0229 4510	5K
R7221 to R7229	0229 4500	1K
R7230 to R7232	0239 0201 *	25K
R7233 & R7234	0229 4510	5K
R7235 & R7236	0229 4500	1K
	RESISTORS (7300)	
R7301 to R7309	0239 0201 *	25K
R7311 to R7319	0229 4510	5K
R7321 to R7329	0229 4500	1K
R7331 & R7332	0239 0201 *	25K
R7333 & R7334	0229 4510	5K
R7335 & R7336	0229 4500	1K

* To be inspected and routed to stores under 0239 0202 red dot, and 0239 0203 green dot.

PARTS LIST FOR CONNECTORS AND FRONT PANEL COMPONENTS:
MAIN FRAME MODULE

Symbol	Part Number	Description
	NEON LAMPS	
Note:	The lamps below are neon, NE-2E, ultra-miniature bayonet, and white unless otherwise specified.	
DS6100	1201 1580	Sync Ready Indicator
DS6500	1201 1580	X 1 Indicator
DS6501	1201 1580	Beam Position Indicator, Left
DS6502	1201 1580	Beam Position Indicator, Right
DS6600	1201 1580	Sweep Ready Indicator
DS6605	1201 1580	Beam Position Indicator, Up
DS6606	1201 1580	Beam Position Indicator, Down
Note:	The lamps below are neon, NE-2E with built-in 100K-ohm resistor, ultra-miniature bayonet, and white unless otherwise specified.	
DS6400	1201 1530	Microsecond Indicator
DS6401	1201 1530	Millisecond Indicator
DS6402	1201 1530	Second Indicator
DS6403	1201 1530	Decimal Point Indicator, bX
DS6404	1201 1530	Decimal Point Indicator, cX
DS6405	1201 1530	Decimal Point Indicator, aX
DS6641	1201 1530	Decimal Point Indicator, aY
DS6642	1201 1530	Decimal Point Indicator, bY
DS6643	1201 1530	Decimal Point Indicator, cY
DS6644	1201 1530	Volt Indicator
DS6645	1201 1530	Millivolt Indicator
DS7001	1201 1530	Negative Polarity Indicator
	INCANDESCENT LAMPS	
Note:	The lamps below are incandescent, miniature bayonet, and 0.15 ampere unless otherwise specified.	
DS6525	1200 1310	Pilot Lamp
DS6601	1200 1310	Sweep Rate Dial Lamp

PARTS LIST FOR CONNECTORS AND FRONT PANEL COMPONENTS:
MAIN FRAME MODULE (Continued)

Symbol	Part Number	Description
	ELECTRICAL CONNECTORS	
J5100	0905 7350	receptacle, female, 24 contacts
J5200	0905 7350	receptacle, female, 24 contacts
J6000	0905 7360	receptacle, female, 32 contacts
J6100	0902 9080	receptacle, rf, female, 1 contact, BNC (EXT SYNC)
J6101	0902 9080	receptacle, rf, female, 1 contact, BNC (GATE OUT)
J6400	0905 7350	receptacle, female, 24 contacts
J6700	0901 5560	receptacle, female, 2 contacts
J6800	5028 6301	assembly, cable, external, horizontal readout
J6900	5028 6302	assembly, cable, external, vertical readout
	RESISTORS (6100)	

Notes: 1. All resistors are fixed, composition, and 1/2 watt unless otherwise specified.

2. Resistance values in ohms: K = thousand
M = million

R6104	0107 1961	variable, 100K/100K (TRIG LEVEL)
R6171	0107 1971	variable, 10K (STABILITY)

PARTS LIST FOR CONNECTORS AND FRONT PANEL COMPONENTS: MAIN FRAME MODULE (Continued)

Symbol	Part Number	Description
		RESISTORS (6600)
Notes:	1. All resistors are fixed, composition, and 1/2 watt unless otherwise specified.	
	2. Resistance values in ohms:	K = thousand M = million
R6600	0239 0364	film, 15K, ± 1%
R6601	0239 0387	film, 22.1K, ± 1%
R6602	0239 0388	film, 4320, ± 1%
R6603	0107 2031	variable, 50K (SWP CAL)
R6604	0107 1991	variable, 50K, ± 20% (VERNIER)
R6605	0203 3790	20K, ± 5%, 1W
R6611	0107 2011	variable, 100K/100K (INTENSITY)
R6612	0203 0660	5600, ± 5%
R6613	0203 0820	27K, ± 5%
R6614	0203 0790	20K, ± 5%
R6620 F,R	0107 1871	variable, 300K/30K (PATTERN POSITIONING, HOR)
R6625	0107 1861	variable, 300K/300K (PATTERN POSITIONING)
R6626	0108 4100	variable, 50K, ± 20%, 2W (SWEEP SEPARATE)
R6631	0203 0820	27K, ± 5%
R6632	0203 0930	75K, ± 5%
R6633	0203 0870	43K, ± 5%
R6635	0203 3810	24K, ± 5%, 1W
R6636	0107 1981	variable, 50K (ASTIG)
R6637	0108 5410	variable, 2.5M, ± 20% (FOCUS)
R6641 to R6645	0228 7280	1M, ± 10%, 1/4W
R7100	0107 1881	variable, 500K/500K (INDEX POSITIONING, HOR)

PARTS LIST FOR CONNECTORS AND FRONT PANEL COMPONENTS:
MAIN FRAME MODULE (Continued)

Symbol	Part Number	Description
	SWITCHES	
Note:	All readout switches are thumb-activated and unit decade.	
S610	0501 4951	rotary (TRIGGER SOURCE)
S611	0501 4941	rotary (TRIGGER MODE)
S612	0107 1961	SPST (Part of R6104)
S613	0108 4800	SPST (Part of R6167)
S614	0501 5891	push button (SWITCH MODE)
S640	0501 3441	rotary, 9 decks, 24 positions (SWEEP RATE)
S650 & S651	0501 6111	rotary (DISPLAY LOGIC & EXPANDED SWITCH)
S660	0501 5901	push button (ARMED SWEEP RESET)
S661	0503 1330	slide, DPDT (VERNIER)
S662	0501 5341	toggle (POWER)
S701	0501 5881	push button (10-90% ALIGNMENT)
S702	0501 4991	rotary (POLARITY)
S710 to S712	0501 4961	Horizontal Readout Switches
S713	0501 6001	push button (RECORD)
S720 to S722	0501 4961	Vertical Readout Switches

PARTS LIST FOR CONNECTORS AND FRONT PANEL COMPONENTS:
MAIN FRAME MODULE (Concluded)

Symbol	Part Number	Description
	ELECTRON TUBES	
V101*	2501 2440	K1736P1
	2501 2450	K1736P2
	2501 2460	K1736P7
	2501 2470	K1736P11

* Depending on Sales order

DU MONT
INSTRUMENT WARRANTY AND SERVICE NOTICE

WARRANTY

Allen B. Du Mont Laboratories, Inc. warrants that each new Cathode-ray Oscilloscope, Automotive Test Equipment, and other Electronic or Electrical Test or Measuring Equipment (hereinafter referred to as "Instrument") manufactured or sold by it, is free from defects in material or workmanship under normal use and service for a period of one year from the date of its sale to the first purchaser for use. If, upon examination by Du Mont, the Instrument is determined to be defective in workmanship or material, Du Mont will, subject to the conditions set forth below, either repair the defective part or replace it with a new part. Du Mont shall not be liable for any delay or failure to furnish a replacement part resulting directly or indirectly from any governmental restriction, priority or allocation or any other governmental regulatory order or action, nor shall Du Mont be liable for damages by reason of the failure of the Instrument to perform properly or for any consequential damages. This warranty does not apply to any Instrument that has been subject to negligence, accident, misuse or improper installation or operation or that in any way has been tampered with, altered or repaired by any person other than an authorized Du Mont service organization or an employee thereof, or to any Instrument whose serial number has been altered, defaced or removed, or to any Instrument purchased within, and thereafter removed beyond, the continental limits of the United States.

This warranty shall, at Du Mont's option, become void unless registration thereof is promptly effected as provided below. This warranty is in lieu of all other warranties, expressed or implied, and no one is authorized to assume any liability on behalf of Du Mont or impose any obligation upon it in connection with the sale of any Instrument, other than as stated above.

REGISTERING THE WARRANTY

To register this warranty, the enclosed warranty registration card must be properly filled out and mailed to the Instrument Service Department immediately upon receipt of the equipment. Complete information is necessary. BOTH THE TYPE NUMBER AND THE SERIAL NUMBER OF THE INSTRUMENT MUST BE GIVEN ON THIS CARD. Instruments must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

CHANGES IN SPECIFICATIONS

The right is reserved to change the published specifications of equipment at any time and to furnish merchandise in accordance with current specifications without incurring any liability to modify equipment previously sold, or to supply new equipment in accordance with earlier specifications excepting under the classification of special apparatus.

SERVICE

In order to insure service under our warranty, the enclosed warranty service card must be properly filled out and returned to the factory. In all cases where service or adjustment is requested, please first contact the factory or authorized depot, giving complete information concerning the nature of the failure and describing the manner in which the equipment was used when failure occurred. THE TYPE NUMBER AND SERIAL NUMBER of the equipment must also be given. In this way, much time can be saved and unnecessary inconvenience often avoided. When writing to the factory in this respect, address:

ALLEN B. DU MONT LABORATORIES, INC.
Instrument Service Department
Industrial Electronics Division
750 Bloomfield Avenue, Clifton, New Jersey

The Instrument Service Department will then send to the customer the written procedure for disposition and shipping instructions. All equipment should be packed and shipped in accordance with this procedure; and identification tags should be attached to each tube or instrument.

REPLACEMENT PARTS

If it is necessary to order a replacement component from the factory, always give the Type number and Serial number of the Instrument. Before ordering parts for in-warranty replacement or purchasing them for out-of-warranty replacement, be sure to consult the Parts List in the Instruction Manual. The Parts List gives the values, tolerances, ratings, and Du Mont part number for all electrical components used in the Instruments. This will help to expedite service.

ALLEN B. DU MONT LABORATORIES, INC.

Industrial Electronics Division

750 Bloomfield Avenue., Clifton, New Jersey

PATENT NOTICE

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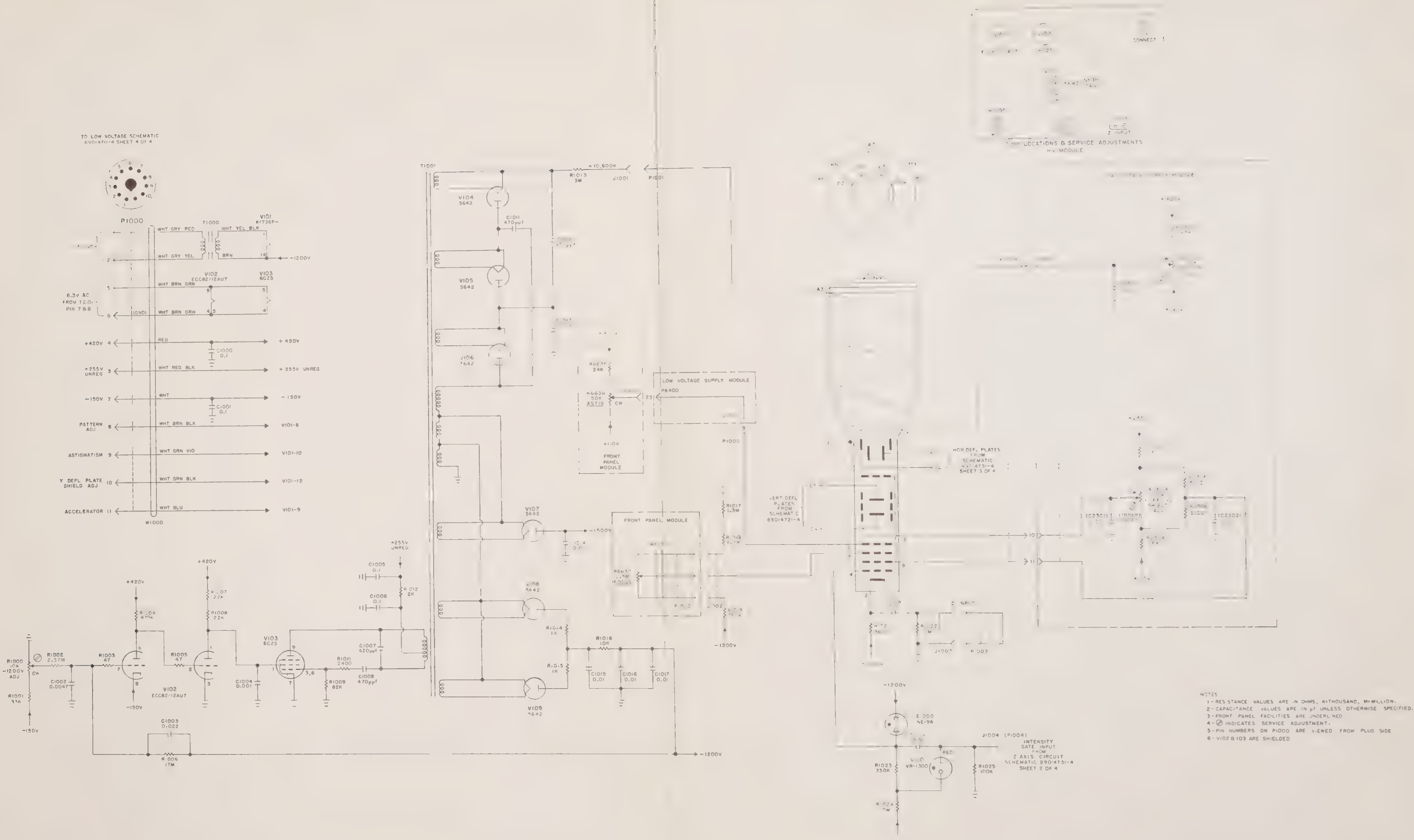

TO LOW VOLTAGE SCHEMATIC
89014711-4 SHEET 4 OF 4
P1000
T1000
V101
WHT GRY RED
WHT YEL BLK
WHT GRY YEL
BRN
-1200V
V102
ECC82/12AU7
V103
6CZ5
WHT BRN GRN
6.3V AC
FROM T2.01
PIN 7 & 8
(GND)
WHT BRN ORN
+420V
RED
C1000
0.1
+255V
UNREG
WHT RED BLK
+255V UNREG
-150V
WHT
C1001
0.1
PATTERN
ADJ
WHT BRN BLK
V101-8
ASTIGMATISM
WHT GRN VIO
V101-10
Y DEFL PLATE
SHIELD ADJ
WHT GRN BLK
V101-12
ACCELERATOR
WHT BLU
V101-9
W1000
T1001
V104
5642
C1011
470μμf
V105
5642
V106
5642
R1013
3M
+10,600V
J1001
P1001
24K
50K
ASTIG
CW
FRONT
PANEL
MODULE
LOW VOLTAGE SUPPLY MODULE
P6400
P1000
V107
5642
-1500V
FRONT PANEL MODULE
R1017
1.3M
VERT DEFL
PLATES
FROM
SCHEMATIC
89014721-4
HOR DEFL PLATES
FROM
SCHEMATIC
SHEET 3 OF 4
V108
5642
R1016
10K
C1015
0.01
C1016
0.01
C1017
0.01
V109
5642
-1200V
R1000
10K
-1200V
ADJ
R1001
33K
R1002
2.37M
C1002
0.0047
R1003
47
R1005
47
R1008
22K
C1004
0.001
C1005
0.1
C1006
0.1
R1012
2K
C1007
620μμf
R1011
2400
C1008
470μμf
R1009
82K
C1003
0.022
17M
NE-96
VR-1300
R1023
330K
R1025
100K
J1004 (P1004)
INTENSITY
GATE INPUT
FROM
Z AXIS CIRCUIT
SCHEMATIC 89014731-4
SHEET 2 OF 4
(C2301)
(C2302)
LOCATIONS & SERVICE ADJUSTMENTS
HV MODULE
Z INPUT

NOTES
1 - RESISTANCE VALUES ARE IN OHMS, K=THOUSAND, M=MILLION.
2 - CAPACITANCE VALUES ARE IN μf UNLESS OTHERWISE SPECIFIED.
3 - FRONT PANEL FACILITIES ARE UNDERLINED
4 - ⊘ INDICATES SERVICE ADJUSTMENT.
5 - PIN NUMBERS ON P1000 ARE VIEWED FROM PLUG SIDE
6 - V102 & 103 ARE SHIELDED

Figure 3-1. SCHEMATIC, HIGH VOLTAGE POWER SUPPLY MODULE DU MONT TYPE 425 OSCILLOSCOPE (Reference Drawing 8901 4701-4, Sheet 1 of 1)

WAVEFORMS
(Taken With Controls Set As Follows:)

MAIN FRAME

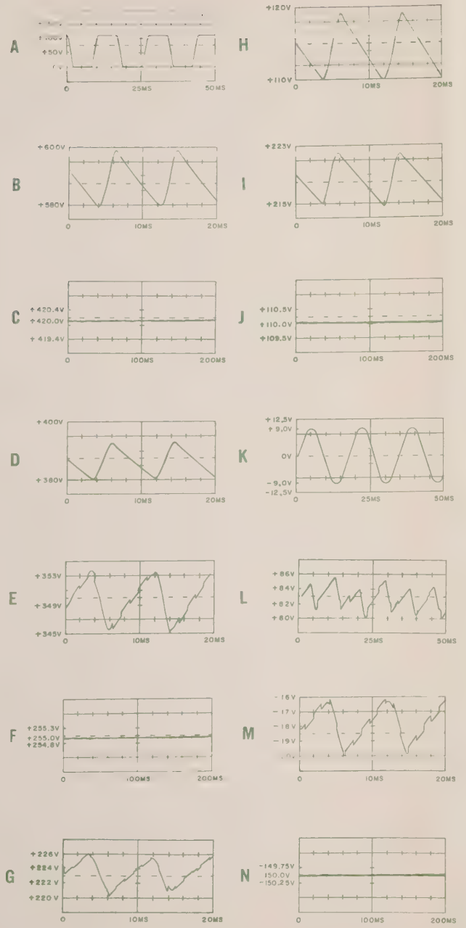
Control	Setting
Digital Read Out	999
Index Positioning	Center dot
Pattern Positioning	Center display with base line on center line
Polarity	+
Trigger Source	+ Int
Trig Level	Preset
Trig/Rec	Preset
Trigger Mode	Armed AC
Sweep Rate	1 Ms/Cm
Switch Mode	Alternate (out)
Display Logic	RO

DUAL TRACE

Control	Setting
Input Selector	Channel A
Volts/Cm	Cal
AC/DC	DC
Polarity	Normal
Read Out	Normal

DELAYING SWEEP

Control	Setting
Trigger Mode	AC
Trig/Rec	Preset
Trig Level	Preset
Trigger Source	+ Line
Pick-Off Source	Del Swp
Delay Zero	Fully cw
Sweep Rate	5 Ms/Cm
Length and Delay Multiplier	Adjust these controls to agree with waveform



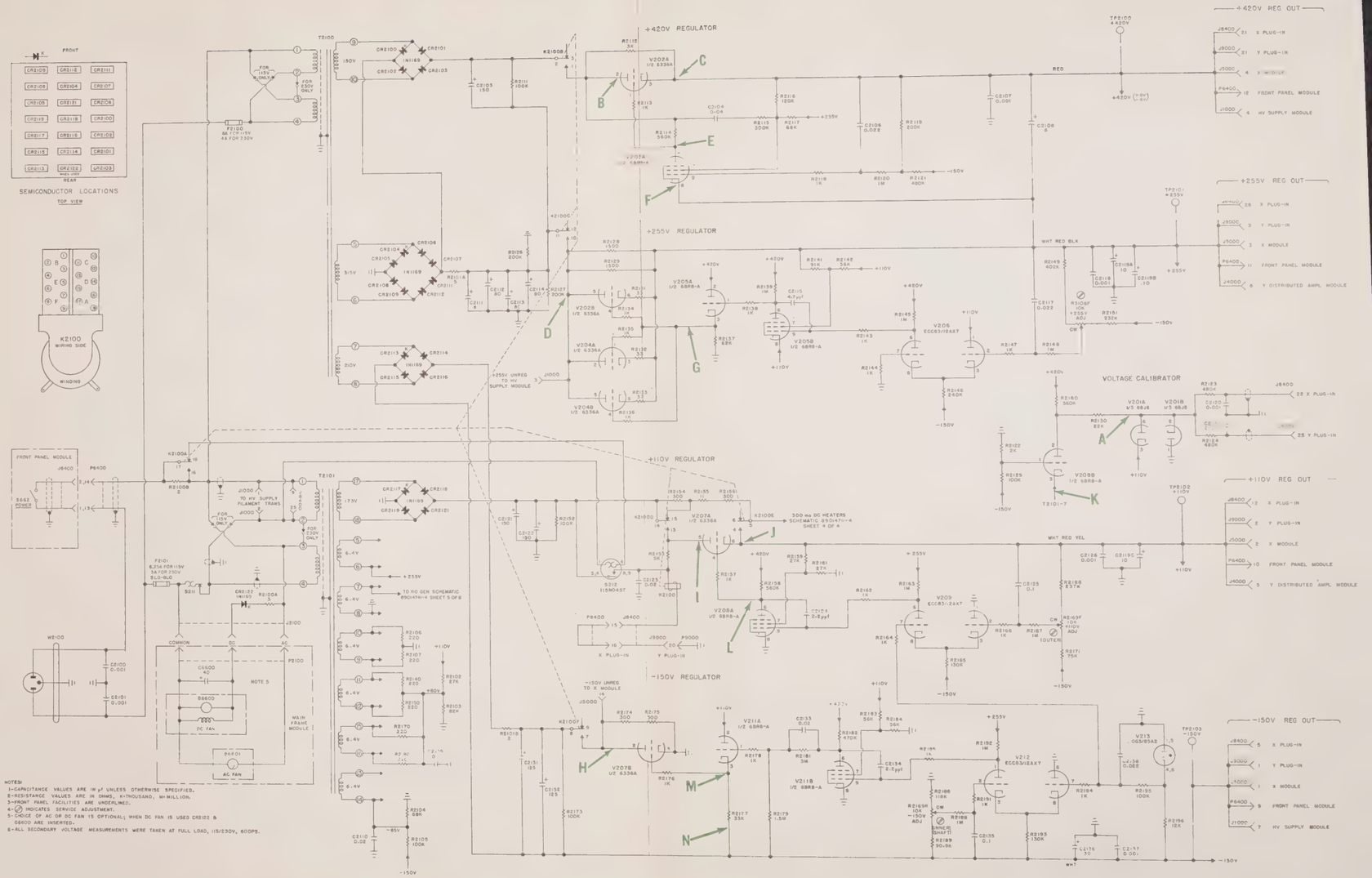


Figure 3-2. SCHEMATIC, LOW VOLTAGE POWER SUPPLY; LOW VOLTAGE MODULE DU MONT TYPE 425 OSCILLOSCOPE (Reference Drawing 8901 4711-4, Sheet 1 of 4)

WAVEFORMS
(Taken With Controls Set As Follows:)

MAIN FRAME

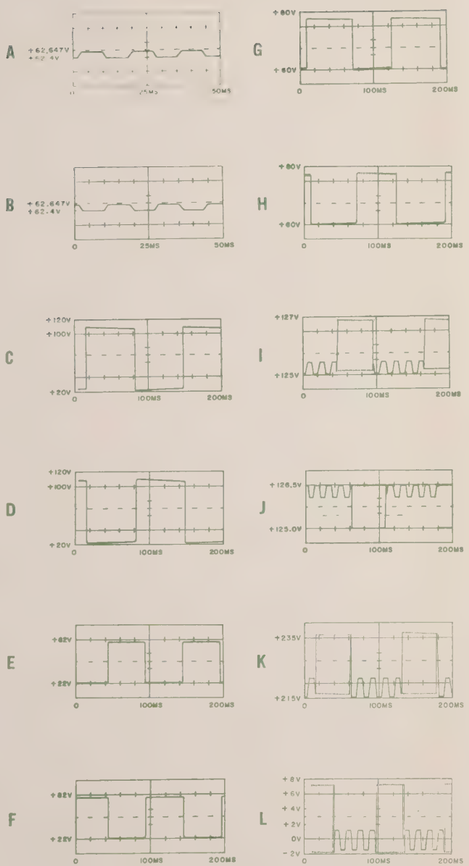
Control	Setting
Digital Read Out	999
Index Positioning	Center dot
Pattern Positioning	Center display with base line on center line
Polarity	+
Trigger Source	+ Int
Trig Level	Preset
Trig/Rec	Preset
Trigger Mode	Armed AC
Sweep Rate	1 Ms/Cm
Switch Mode	Alternate (out)
Display Logic	RO

DUAL TRACE

Control	Setting
Input Selector	Channel A
Volts/Cm	Cal
AC/DC	DC
Polarity	Normal
Read Out	Normal

DELAYING SWEEP

Control	Setting
Trigger Mode	AC
Trig/Rec	Preset
Trig Level	Preset
Trigger Source	+ Line
Pick-Off Source	Del Swp
Delay Zero	Fully cw
Sweep Rate	5 Ms/Cm
Length and Delay Multiplier	Adjust these controls to agree with waveform



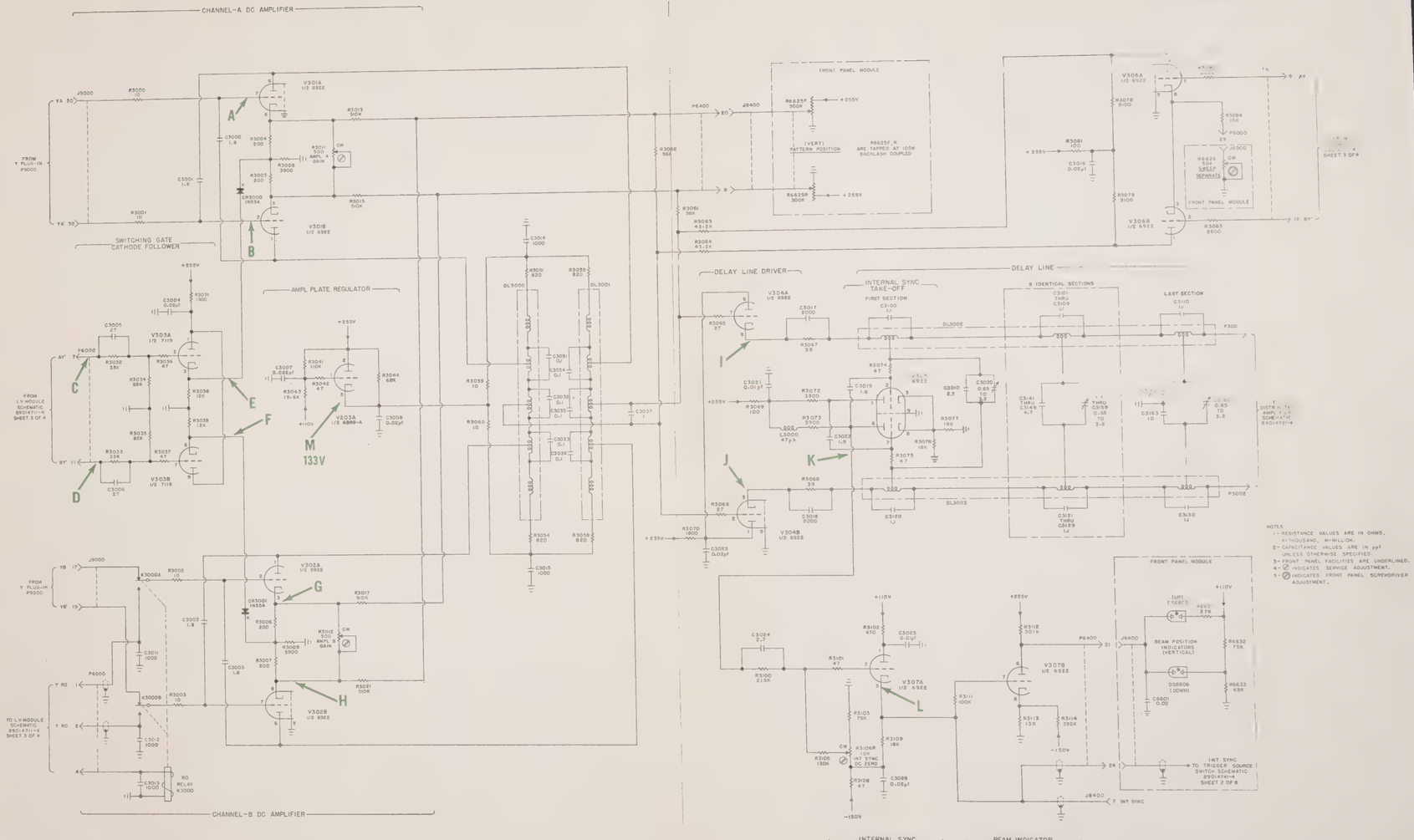


Figure 3-3. SCHEMATIC, Y SWITCH AND DRIVER; LOW VOLTAGE MODULE DU MONT TYPE 425 OSCILLOSCOPE
(Reference Drawing 8901 4711-4, Sheet 2 of 4)

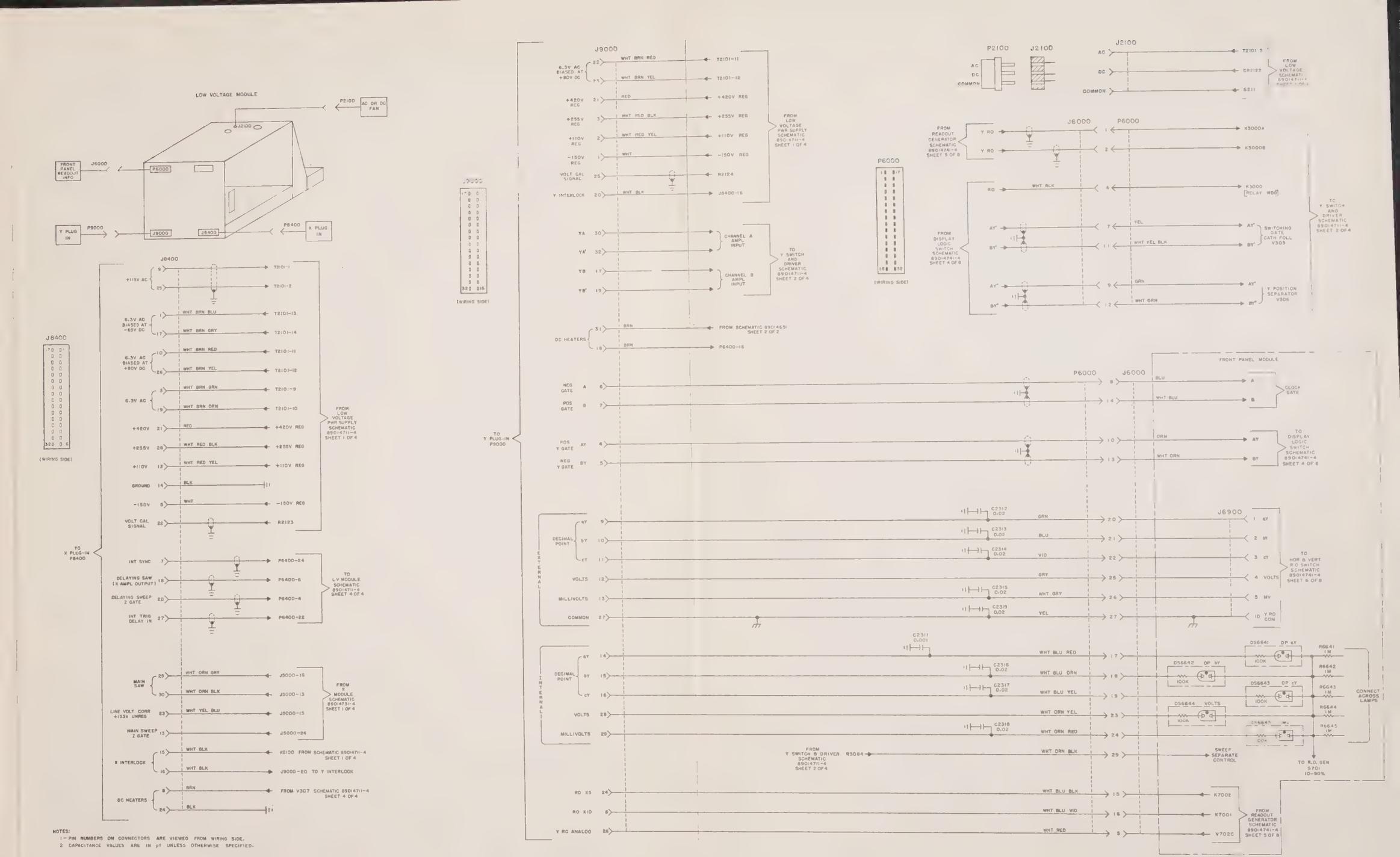
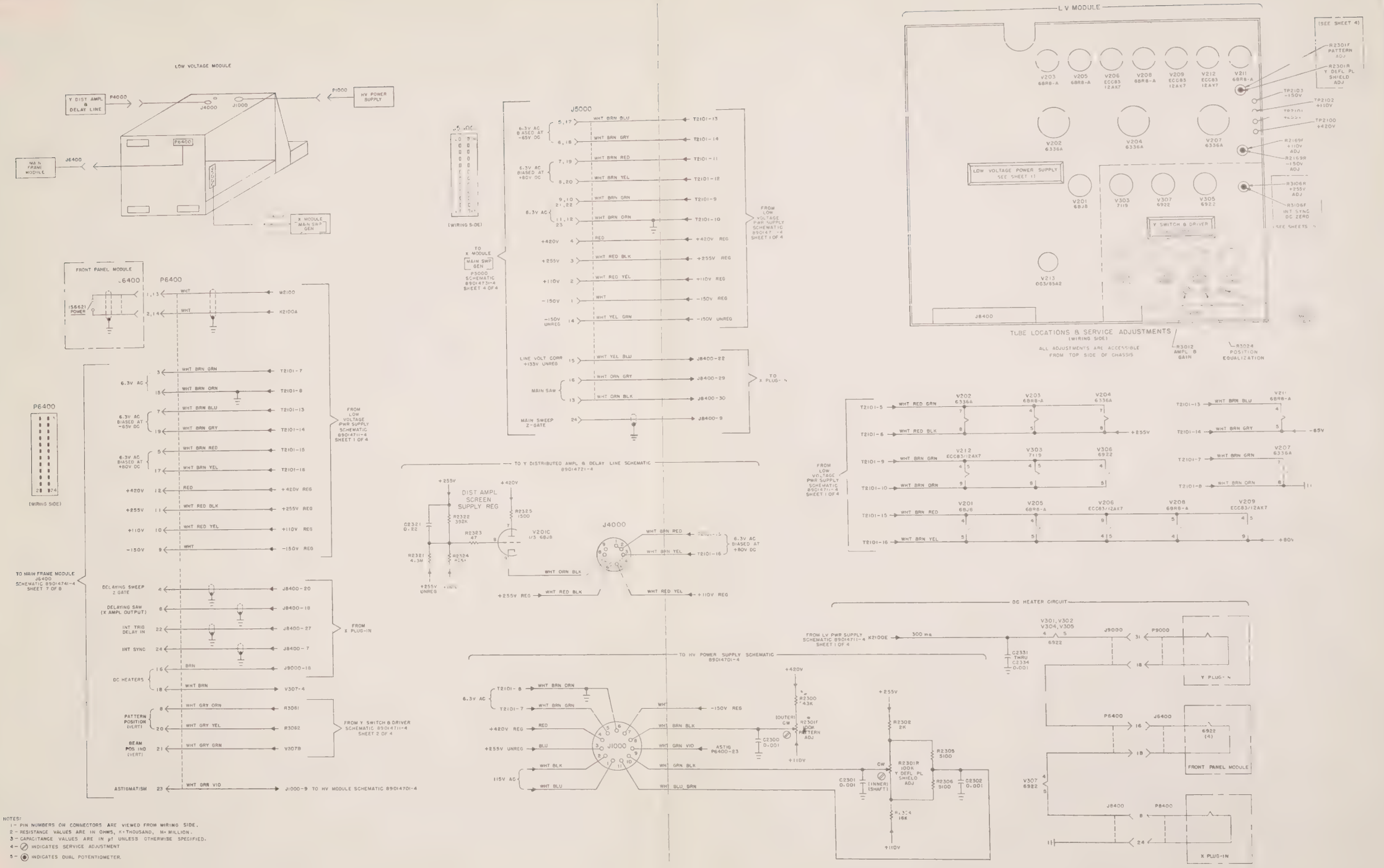


Figure 3-4. SCHEMATIC, CONNECTORS; LOW VOLTAGE MODULE DU MONT TYPE 425 OSCILLOSCOPE

(Reference Drawing 8901 4711-4, Sheet 3 of 4)



NOTES:
1 - PIN NUMBERS ON CONNECTORS ARE VIEWED FROM WIRING SIDE.
2 - RESISTANCE VALUES ARE IN OHMS, K = THOUSAND, M = MILLION.
3 - CAPACITANCE VALUES ARE IN μf UNLESS OTHERWISE SPECIFIED.
4 - ⊘ INDICATES SERVICE ADJUSTMENT.
5 - ◉ INDICATES DUAL POTENTIOMETER.

Figure 3-5. SCHEMATIC, CONNECTORS, TUBE LOCATIONS AND ADJUSTMENTS; LOW VOLTAGE MODULE DU MONT TYPE 425 OSCILLOSCOPE

(Reference Drawing 8901 4711-4, Sheet 4 of 4)

WAVEFORMS
(Taken With Controls Set As Follows:)

MAIN FRAME

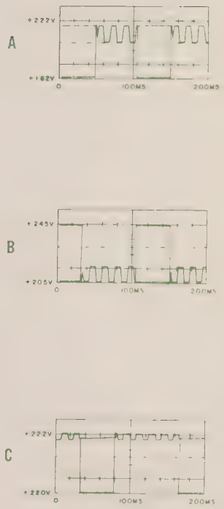
Control	Setting
Digital Read Out	999
Index Positioning	Center dot
Pattern Positioning	Center display with base line on center line
Polarity	+
Trigger Source	+ Int
Trig Level	Preset
Trig/Rec	Preset
Trigger Mode	Armed AC
Sweep Rate	1 Ms/Cm
Switch Mode	Alternate (out)
Display Logic	RO

DUAL TRACE

Control	Setting
Input Selector	Channel A
Volts/Cm	Cal
AC/DC	DC
Polarity	Normal
Read Out	Normal

DELAYING SWEEP

Control	Setting
Trigger Mode	AC
Trig/Rec	Preset
Trig Level	Preset
Trigger Source	+ Line
Pick-Off Source	Del Swp
Delay Zero	Fully cw
Sweep Rate	5 Ms/Cm
Length and Delay Multiplier	Adjust these controls to agree with waveform



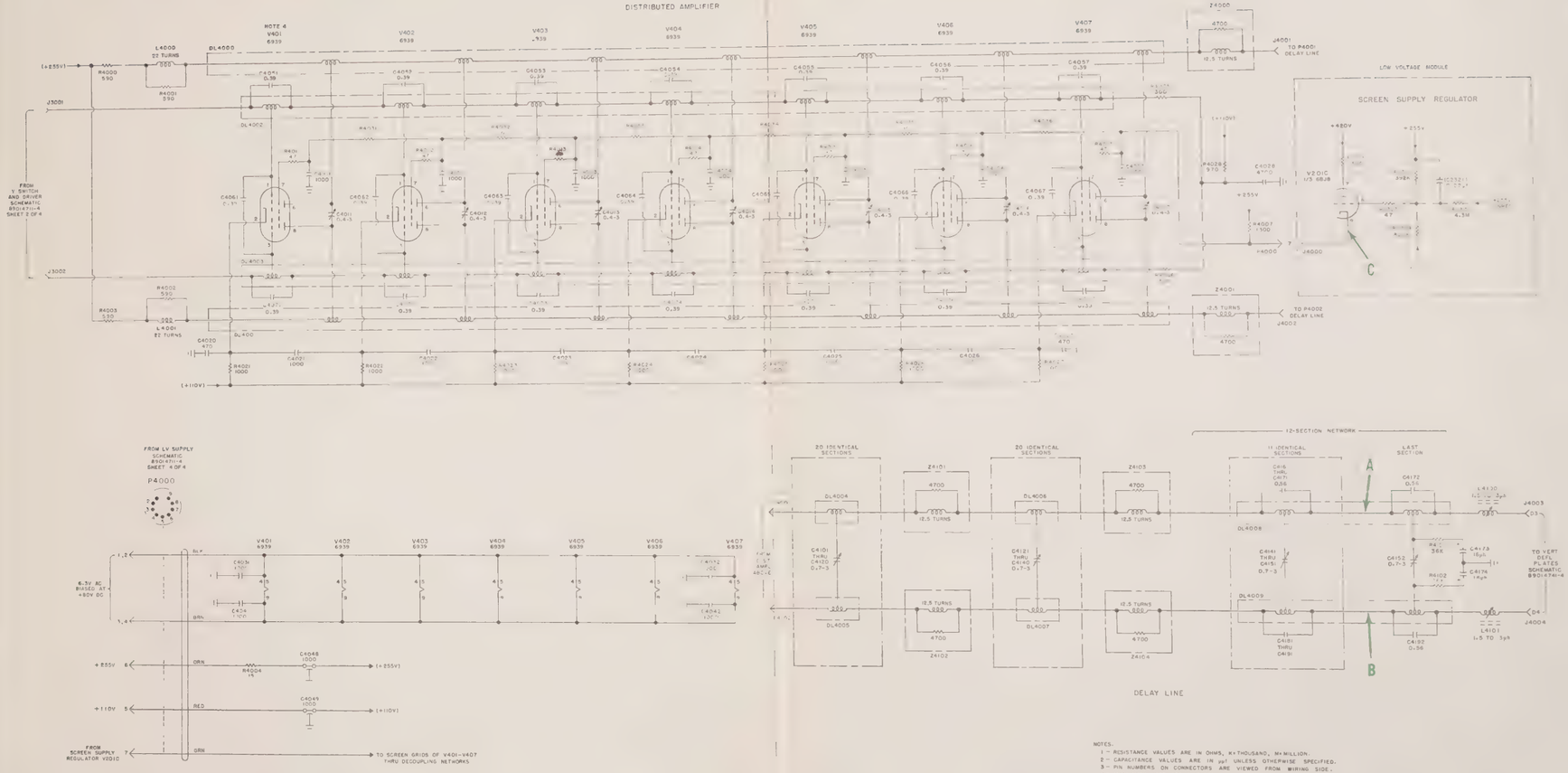

DISTRIBUTED AMPLIFIER
DELAY LINE
FROM LV SUPPLY SCHEMATIC 8501-4701-4 SHEET 4 OF 4
FROM Y SIGNAL AND DRIVER SCHEMATIC 8501-4701-4 SHEET 2 OF 4
LOW VOLTAGE MODULE
SCREEN SUPPLY REGULATOR
TO SCREEN GRIDS OF V401-V407 THRU DECOUPLING NETWORKS
TO VERT DEFL PLATES SCHEMATIC 8501-4701-4
12-SECTION NETWORK
20 IDENTICAL SECTIONS
11 IDENTICAL SECTIONS
LAST SECTION
NOTES.
1 - RESISTANCE VALUES ARE IN OHMS, K=THOUSAND, M=MILLION.
2 - CAPACITANCE VALUES ARE IN μμf UNLESS OTHERWISE SPECIFIED.
3 - PIN NUMBERS ON CONNECTORS ARE VIEWED FROM WIRING SIDE.
4 - V401 THRU V407 ARE SHIELDED.

Figure 3-6. SCHEMATIC, Y DISTRIBUTED AMPLIFIER AND DELAY LINE MODULE DU MONT TYPE 425 OSCILLOSCOPE (Reference Drawing 8901 4721-4, Sheet 1 of 1)

WAVEFORMS
(Taken With Controls Set As Follows)

MAIN FRAME

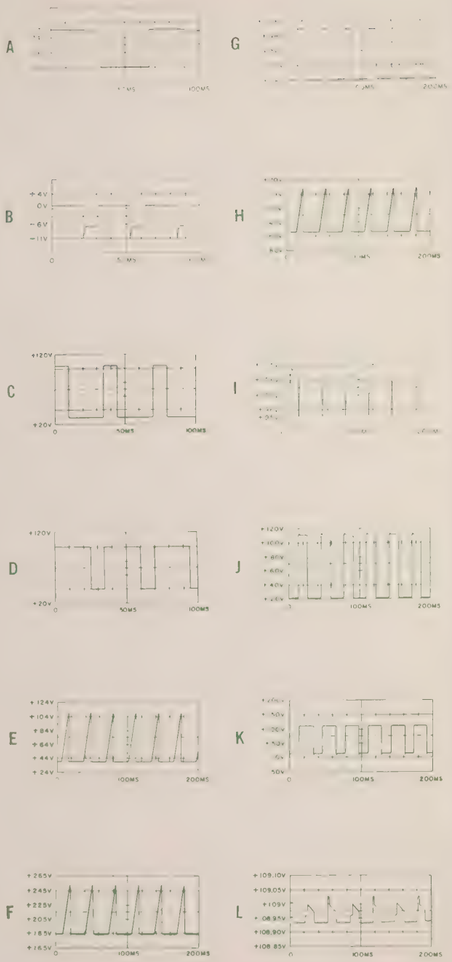
Control	Setting
Digital Read Out	999
Index Positioning	Center dot
Pattern Positioning	Center display with base line on center line
Polarity	+
Trigger Source	+ Int
Trig Level	Preset
Trig/Rec	Preset
Trigger Mode	Armed AC
Sweep Rate	1 Ms/Cm
Switch Mode	Alternate (out)
Display Logic	[illegible]

DUAL TRACE

Control	Setting
Input Selector	[illegible] A
Volts/Cm	[illegible]
AC/DC	DC
Polarity	Normal
Read Out	Norm [illegible]

DELAYING SWEEP

Control	Setting
Trigger Mode	AC
Trig/Rec	Preset
Trig Level	Preset
Trigger Source	+ Line
Pick-Off Source	Del Swp
Delay Zero	Fully cw
Sweep Rate	5 Ms/Cm
Length and Delay Multiplier	Adjust these controls to agree with waveform



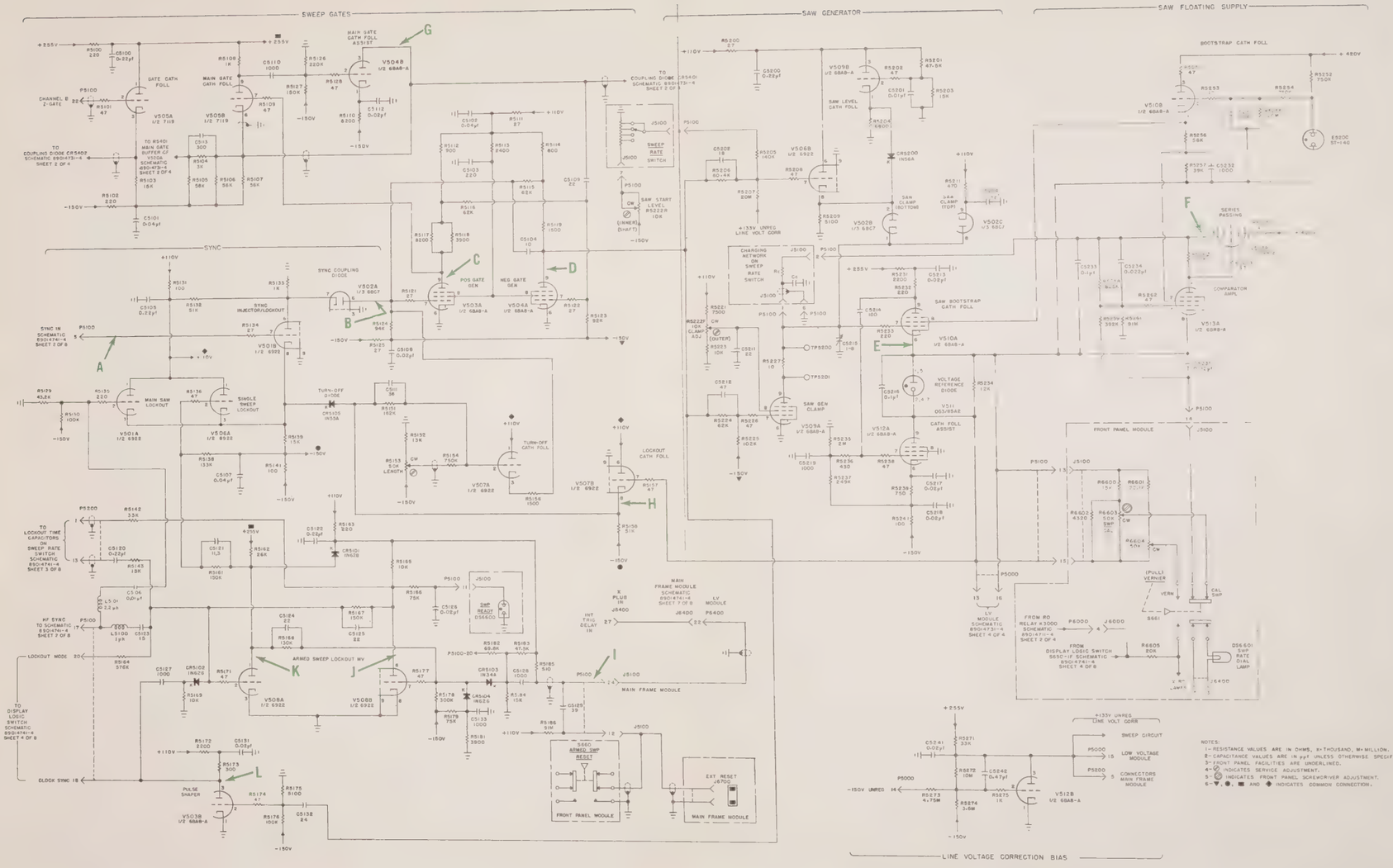
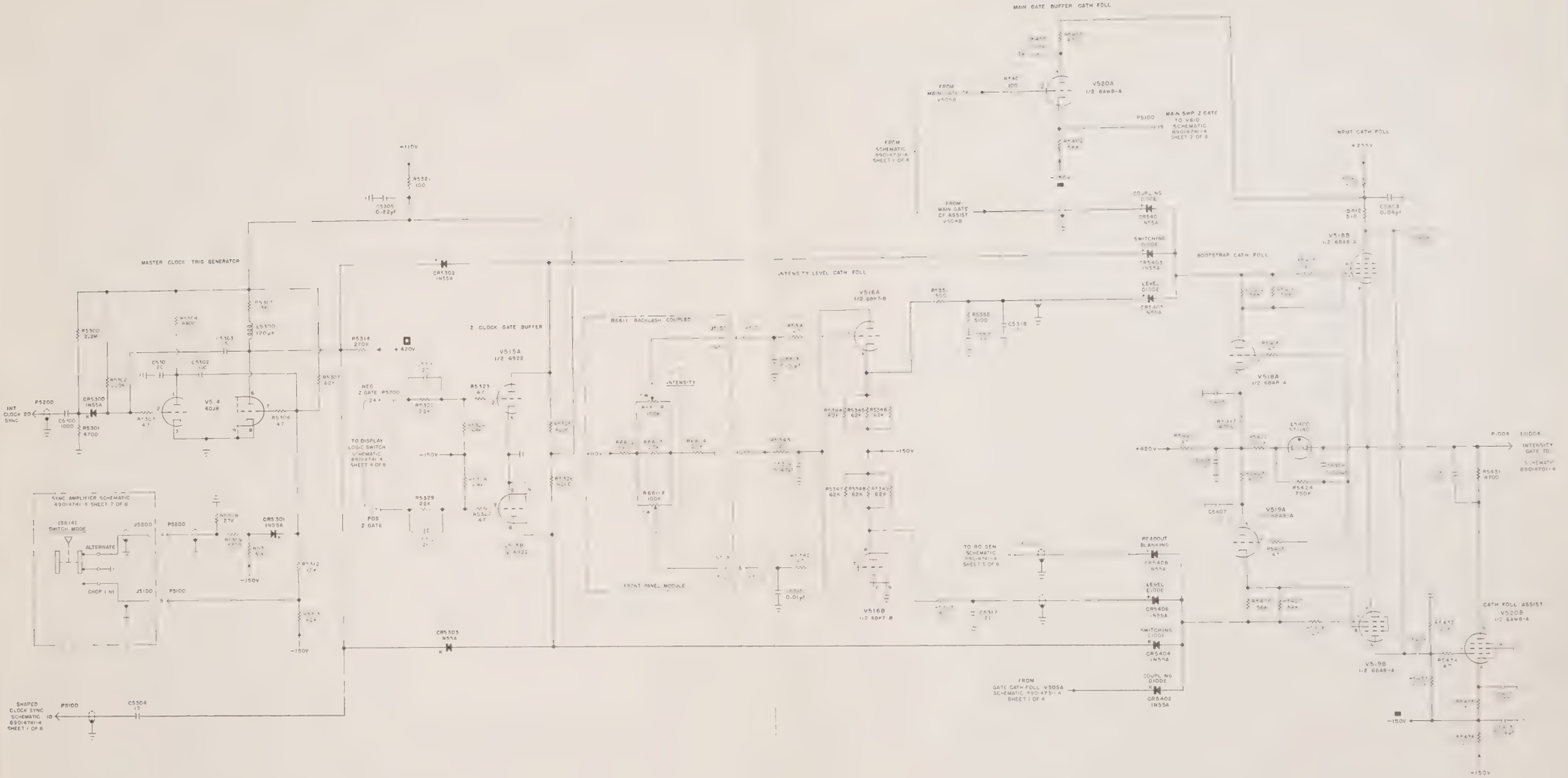


Figure 3-7. SCHEMATIC, MAIN SWEEP GENERATOR; X MODULE
DU MONT TYPE 425 OSCILLOSCOPE
(Reference Drawing 8901 4731-4, Sheet 1 of 4)



NOTES:
1 – RESISTANCE VALUES ARE IN OHMS, K=THOUSAND, M= MILLION.
2 – CAPACITANCE VALUES ARE IN μμf UNLESS OTHERWISE SPECIFIED.
3 – FRONT PANEL FACILITIES ARE UNDERLINED.
4 – ⏚ INDICATES COMMON CONNECTION.
5 – ▣ INDICATES COMMON CONNECTION (SEE SHEET 3).

Figure 3-8. SCHEMATIC, Z AXIS CIRCUIT; X MODULE DU MONT TYPE 425 OSCILLOSCOPE (Reference Drawing 8901 4731-4, Sheet 2 of 4)

WAVEFORMS
(Taken With Controls Set As Follows:)

MAIN FRAME

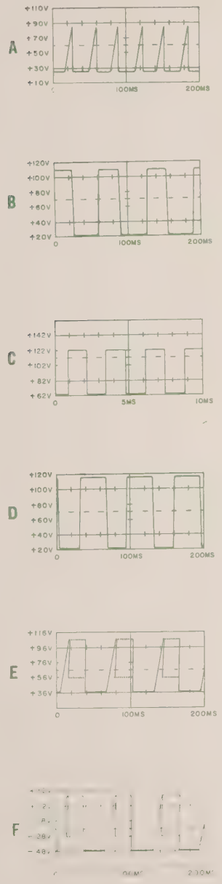
Control	Setting
Digital Read Out	999
Index Positioning	Center dot
Pattern Positioning	Center display with base line on center line
Polarity	+
Trigger Source	+ Int
Trig Level	Preset
Trig/Rec	Preset
Trigger Mode	Armed AC
Sweep Rate	1 Ms/Cm
Switch Mode	Alternate (out)
Display Logic	RO

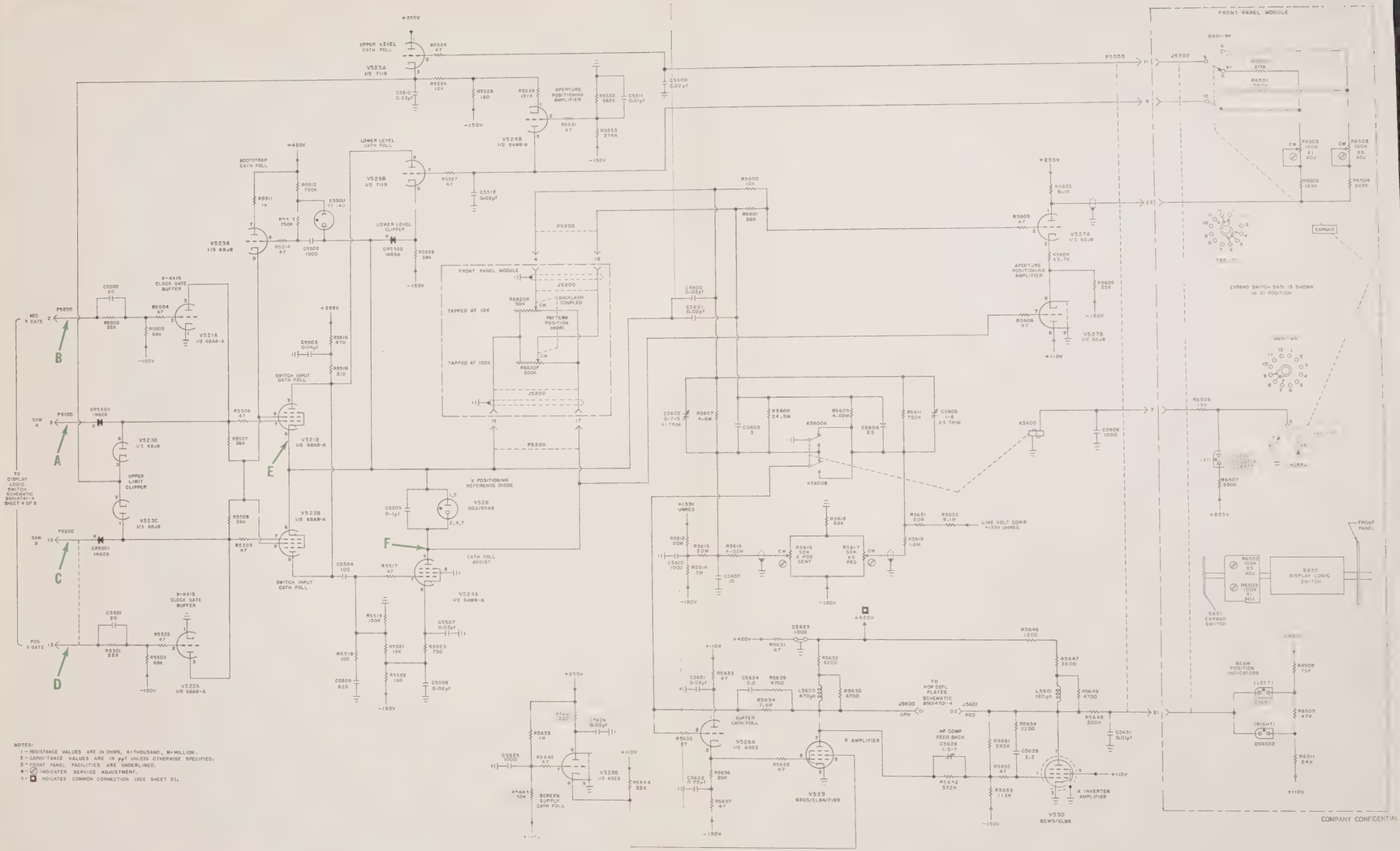
DUAL TRACE

Control	Setting
Input Selector	Channel A
Volts/Cm	Cal
AC/DC	DC
Polarity	Normal
Read Out	Normal

DELAYING SWEEP

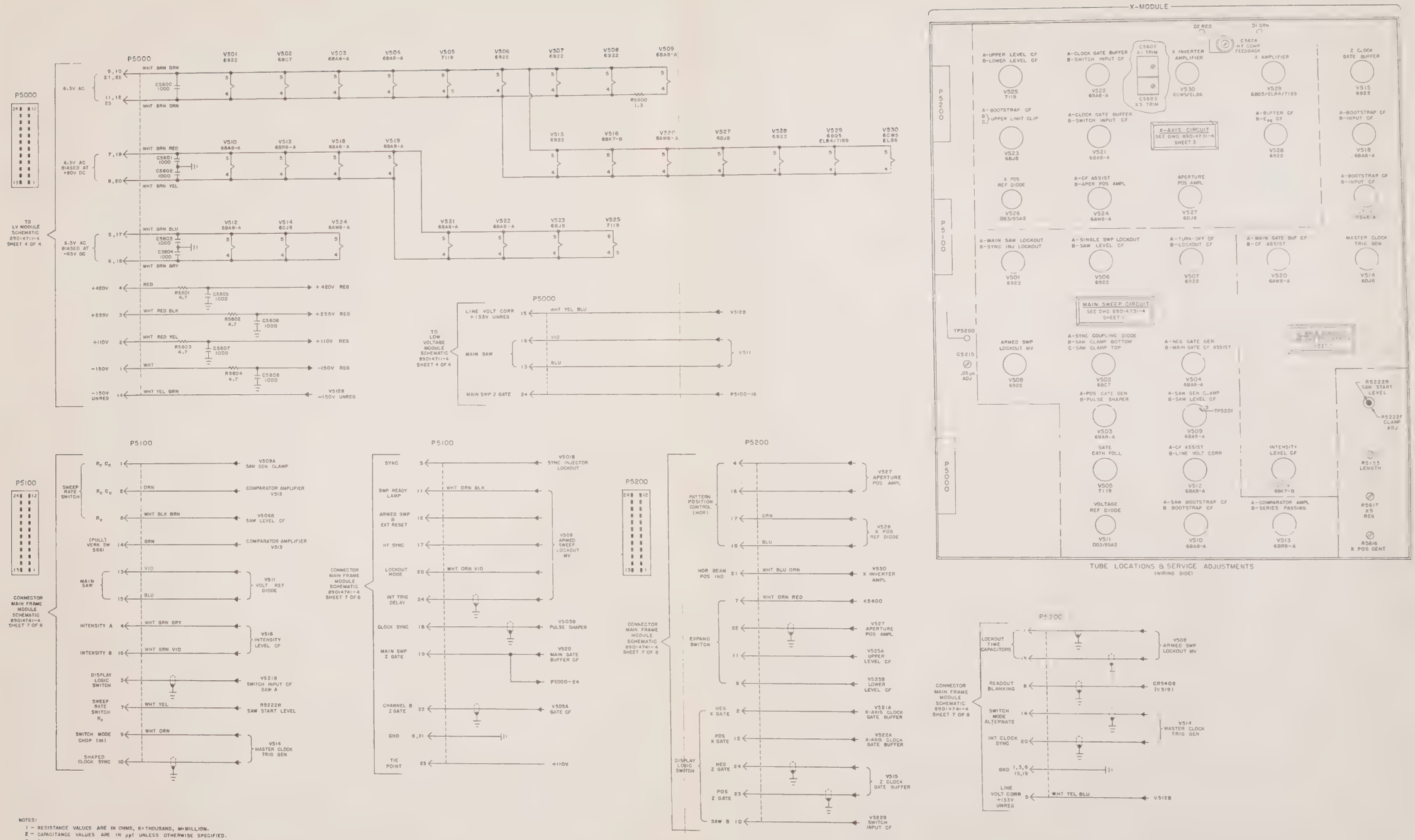
Control	Setting
Trigger Mode	AC
Trig/Rec	Preset
Trig Level	Preset
Trigger Source	+ Line
Pick-Off Source	Del Swp
Delay Zero	Fully cw
Sweep Rate	5 Ms/Cm
Length and Delay Multiplier	Adjust these controls to agree with waveform





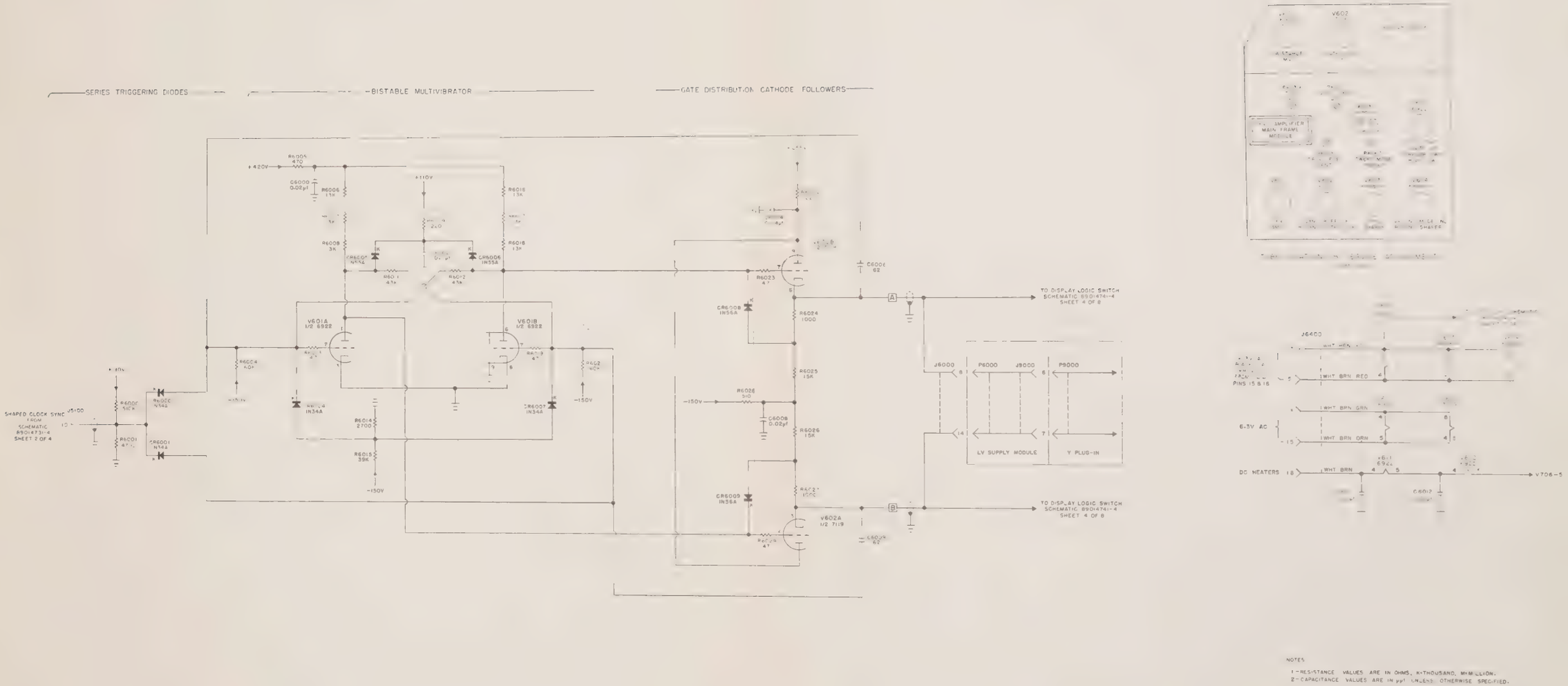
NOTES:
1 - RESISTANCE VALUES ARE IN OHMS, K=THOUSAND, M=MILLION.
2 - CAPACITANCE VALUES ARE IN μμf UNLESS OTHERWISE SPECIFIED.
3 - FRONT PANEL FACILITIES ARE UNDERLINED.
4 - ⓐ INDICATES SERVICE ADJUSTMENT.
5 - □ INDICATES COMMON CONNECTION (SEE SHEET 2).

Figure 3-9. SCHEMATIC, X AXIS CIRCUIT; X MODULE DU MONT TYPE 425 OSCILLOSCOPE (Reference Drawing 8901 4731-4, Sheet 3 of 4)



NOTES:
1 – RESISTANCE VALUES ARE IN OHMS, K=THOUSAND, M=MILLION.
2 – CAPACITANCE VALUES ARE IN µµf UNLESS OTHERWISE SPECIFIED.
3 – PIN NUMBERS ON CONNECTORS ARE VIEWED FROM WIRING SIDE.

Figure 3-10. SCHEMATIC, CONNECTORS, TUBE LOCATION AND ADJUSTMENTS; X MODULE DU MONT TYPE 425 OSCILLOSCOPE (Reference Drawing 8901 4731-4, Sheet 4 of 4)



NOTES

1 – RESISTANCE VALUES ARE IN OHMS, K=THOUSAND, M=MILLION.
2 – CAPACITANCE VALUES ARE IN µµf UNLESS OTHERWISE SPECIFIED.

Figure 3-11. SCHEMATIC, MASTER CLOCK; MAIN FRAME MODULE DU MONT TYPE 425 OSCILLOSCOPE (Reference Drawing 8901 4741-4, Sheet 1 of 8)

WAVEFORMS
(Taken With Controls Set As Follows:)

MAIN FRAME

Control	Setting
Digital Read Out	999
Index Positioning	Center dot
Pattern Positioning	Center display with base line on center line
Polarity	+
Trigger Source	+ Int
Trig Level	Preset
Trig/Rec	Preset
Trigger Mode	Armed AC
Sweep Rate	1 Ms/Cm
Switch Mode	Alternate (out)
Display Logic	RO

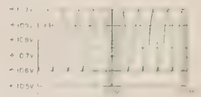
DUAL TRACE

Control	Setting
Input Selector	Channel A
Volts/Cm	Cal
AC/DC	DC
Polarity	Normal
Read Out	Normal

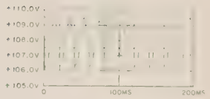
DELAYING SWEEP

Control	Setting
Trigger Mode	AC
Trig/Rec	Preset
Trig Level	Preset
Trigger Source	+ Line
Pick-Off Source	Del Swp
Delay Zero	Fully cw
Sweep Rate	5 Ms/Cm
Length and Delay Multiplier	Adjust these controls to agree with waveform

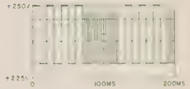
A



B



C



D

E

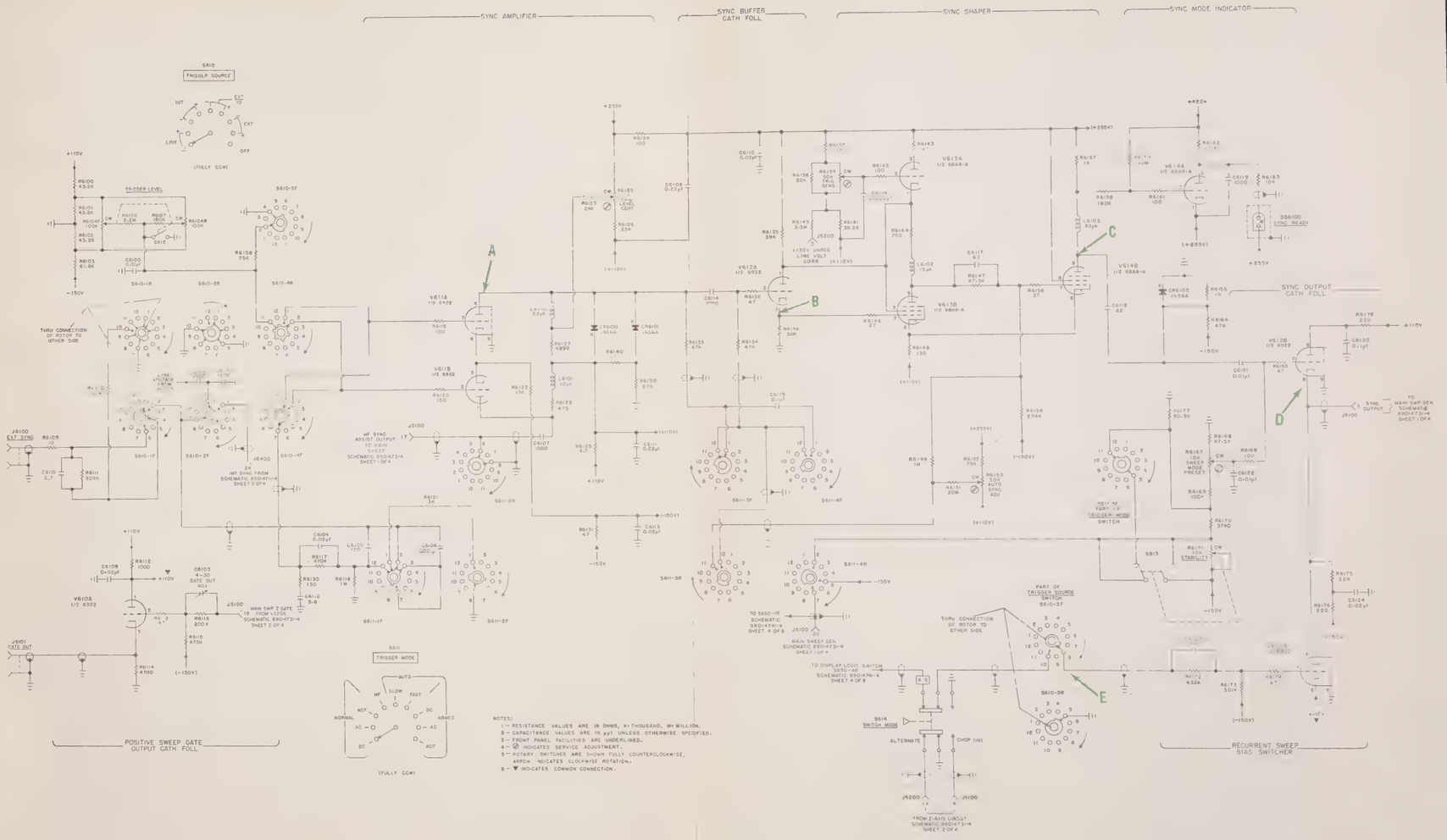

SYNC AMPLIFIER
SYNC BUFFER CATH FOLL
SYNC SHAPER
SYNC MODE INDICATOR
S610 TRIGGER SOURCE
INT
EXT
LINE
OFF
(FULLY CCW)
TRIGGER LEVEL
THRU CONNECTION OF ROTOR TO OTHER SIDE
J6100 EXT SYNC
J6101 GATE OUT
J6400 INT SYNC FROM SCHEMATIC 8901471-4 SHEET 2 OF 4
J5100 MAIN SWP Z GATE TO J5200 SCHEMATIC 8901473-4 SHEET 2 OF 4
HF SYNC ASSIST OUTPUT TO MAIN SWEEP SCHEMATIC 8901473-4 SHEET 1 OF 4
S611 TRIGGER MODE
AUTO
HF
SLOW
FAST
DC
ARMED
NORMAL
AC
ACF
POSITIVE SWEEP GATE OUTPUT CATH FOLL
NOTES:
1 — RESISTANCE VALUES ARE IN OHMS, K=THOUSAND, M=MILLION.
2 — CAPACITANCE VALUES ARE IN μμf UNLESS OTHERWISE SPECIFIED.
3 — FRONT PANEL FACILITIES ARE UNDERLINED.
4 — ⌀ INDICATES SERVICE ADJUSTMENT.
5 — ROTARY SWITCHES ARE SHOWN FULLY COUNTERCLOCKWISE. ARROW INDICATES CLOCKWISE ROTATION.
6 — ▼ INDICATES COMMON CONNECTION.
+255V
+420V
+110V
-150V
+100V
V611A 1/2 6922
V611B 1/2 6922
V612A 1/2 6922
V612B 1/2 6922
V610A 1/2 6922
V613A 1/2 6BA8-A
V613B 1/2 6BA8-A
V614A 1/2 6BA8-A
V614B 1/2 6BA8-A
J5200 +133V UNREG LINE VOLT CORR
DS6100 SYNC READY
SYNC OUTPUT CATH FOLL
TO MAIN SWP GEN SCHEMATIC 8901473-4 SHEET 1 OF 4
PART OF "TRIGGER MODE" SWITCH
PART OF TRIGGER SOURCE SWITCH S610-3F
TO S650-1R SCHEMATIC 8901474-4 SHEET 4 OF 8
MAIN SWEEP GEN SCHEMATIC 8901473-4 SHEET 1 OF 4
TO DISPLAY LOGIC SWITCH S650-4R SCHEMATIC 8901474-4 SHEET 4 OF 8
S614 SWITCH MODE
ALTERNATE
CHOP (ON)
"FROM Z-AXIS CIRCUIT" SCHEMATIC 8901473-4 SHEET 2 OF 4
RECURRENT SWEEP BIAS SWITCHER

Figure 3-12. SCHEMATIC, SYNC AMPLIFIER; MAIN FRAME MODULE DU MONT TYPE 425 OSCILLOSCOPE (Reference Drawing 8901 4741-4, Sheet 2 of 8)

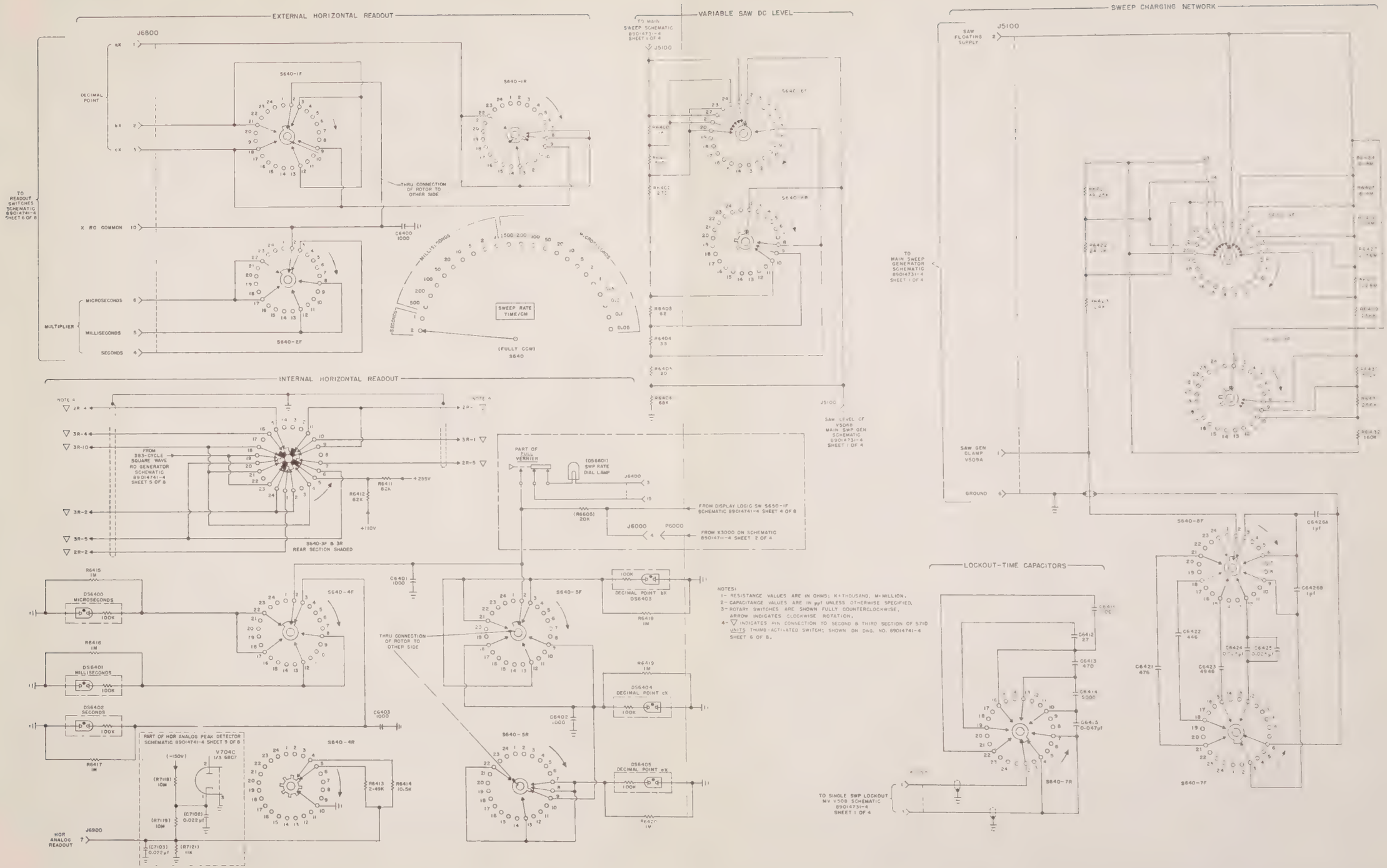

EXTERNAL HORIZONTAL READOUT
VARIABLE SAW DC LEVEL
SWEEP CHARGING NETWORK
INTERNAL HORIZONTAL READOUT
LOCKOUT-TIME CAPACITORS
J6800
J5100
S640-1F
S640-1R
S640-2F
S640-2R
S640-3F & 3R
S640-4F
S640-4R
S640-5F
S640-5R
S640-7F
S640-7R
DECIMAL POINT
MICROSECONDS
MILLISECONDS
SECONDS
MULTIPLIER
SWEEP RATE TIME/CM
(FULLY CCW) S640
THRU CONNECTION OF ROTOR TO OTHER SIDE
TO READOUT SWITCHES SCHEMATIC 8901474I-4 SHEET 6 OF 8
TO MAIN SWEEP SCHEMATIC 8901473I-4 SHEET 1 OF 4
SAW FLOATING SUPPLY
SAW GEN CLAMP V509A
GROUND
SAW LEVEL OF V508A MAIN SWP GEN SCHEMATIC 8901473I-4 SHEET 1 OF 4
FROM 383-CYCLE SQUARE WAVE RO GENERATOR SCHEMATIC 8901474I-4 SHEET 5 OF 8
PART OF FULL VERNIER
(DS6601) SWP RATE DIAL LAMP
FROM DISPLAY LOGIC SW S650-1F SCHEMATIC 8901474I-4 SHEET 4 OF 8
FROM X3000 ON SCHEMATIC 8901471I-4 SHEET 2 OF 4
DS6400 MICROSECONDS
DS6401 MILLISECONDS
DS6402 SECONDS
DS6403 DECIMAL POINT bX
DS6404 DECIMAL POINT cX
DS6405 DECIMAL POINT aX
PART OF HOR ANALOG PEAK DETECTOR SCHEMATIC 8901474I-4 SHEET 5 OF 8
HOR ANALOG READOUT
TO SINGLE SWP LOCKOUT MV V508 SCHEMATIC 8901473I-4 SHEET 1 OF 4
NOTES:
1- RESISTANCE VALUES ARE IN OHMS; K=THOUSAND, M=MILLION.
2- CAPACITANCE VALUES ARE IN μμf UNLESS OTHERWISE SPECIFIED.
3- ROTARY SWITCHES ARE SHOWN FULLY COUNTERCLOCKWISE. ARROW INDICATES CLOCKWISE ROTATION.
4- ▽ INDICATES PIN CONNECTION TO SECOND & THIRD SECTION OF S710 UNITS THUMB-ACTIVATED SWITCH; SHOWN ON DWG. NO. 8901474I-4 SHEET 6 OF 8.

Figure 3-13. SCHEMATIC, SWEEP RATE SWITCH; MAIN FRAME MODULE DU MONT TYPE 425 OSCILLOSCOPE

(Reference Drawing 8901 4741-4, Sheet 3 of 8)

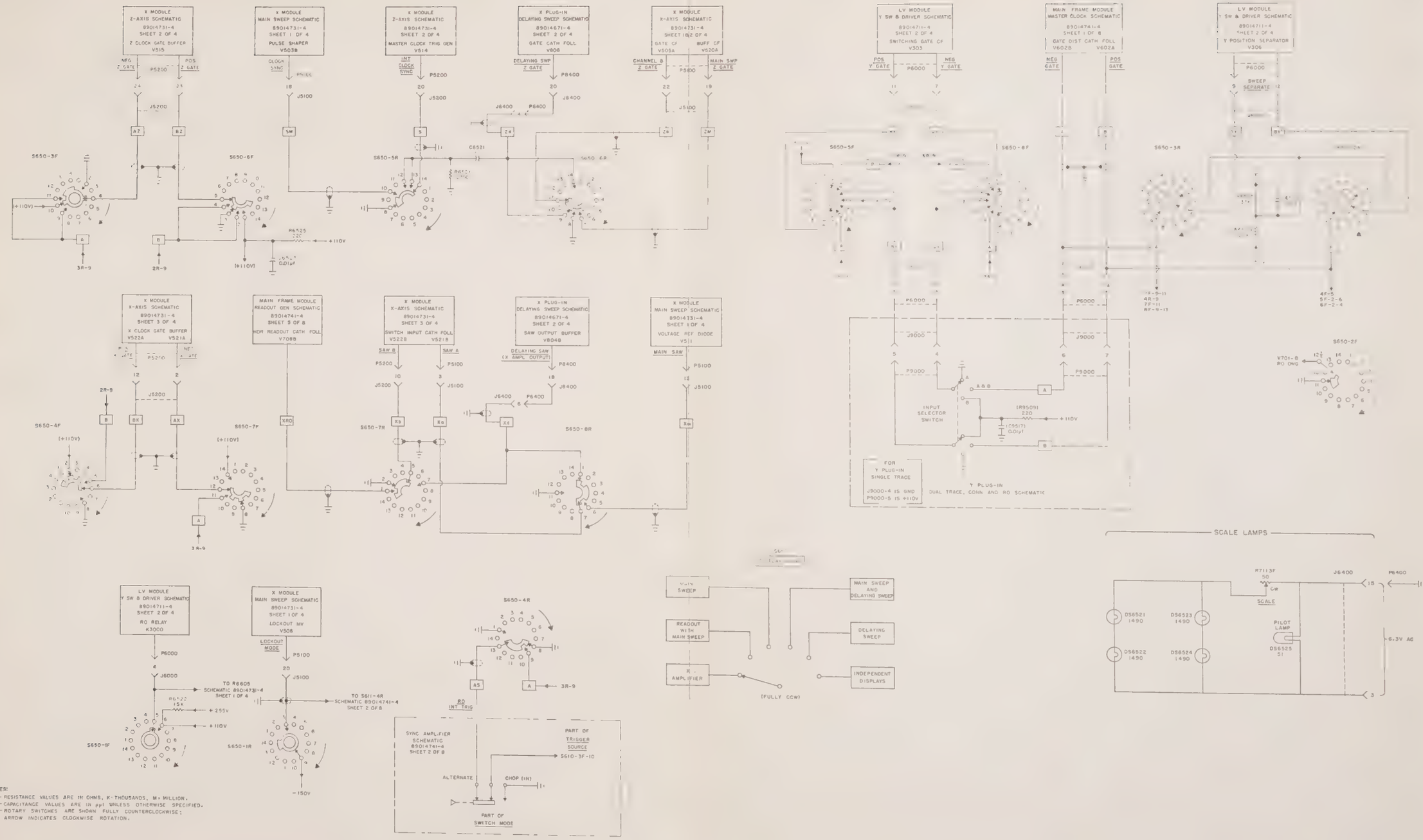

X MODULE Z-AXIS SCHEMATIC 89014731-4 SHEET 2 OF 4 Z CLOCK GATE BUFFER V515
X MODULE MAIN SWEEP SCHEMATIC 89014731-4 SHEET 1 OF 4 PULSE SHAPER V503B
X MODULE Z-AXIS SCHEMATIC 89014731-4 SHEET 2 OF 4 MASTER CLOCK TRIG GEN V514
X PLUG-IN DELAYING SWEEP SCHEMATIC 89014671-4 SHEET 2 OF 4 GATE CATH FOLL V806
X MODULE X-AXIS SCHEMATIC 89014731-4 SHEET 1&2 OF 4 GATE CF V505A BUFF CF V520A
LV MODULE Y SW & DRIVER SCHEMATIC 89014711-4 SHEET 2 OF 4 SWITCHING GATE CF V303
MAIN FRAME MODULE MASTER CLOCK SCHEMATIC 89014741-4 SHEET 1 OF 8 GATE DIST CATH FOLL V602B V602A
LV MODULE Y SW & DRIVER SCHEMATIC 89014711-4 SHEET 2 OF 4 Y POSITION SEPARATOR V306
X MODULE X-AXIS SCHEMATIC 89014731-4 SHEET 3 OF 4 X CLOCK GATE BUFFER V522A V521A
MAIN FRAME MODULE READOUT GEN SCHEMATIC 89014741-4 SHEET 5 OF 8 HOR READOUT CATH FOLL V708B
X MODULE X-AXIS SCHEMATIC 89014731-4 SHEET 3 OF 4 SWITCH INPUT CATH FOLL V522B V521B
X PLUG-IN DELAYING SWEEP SCHEMATIC 89014671-4 SHEET 2 OF 4 SAW OUTPUT BUFFER V804B
X MODULE MAIN SWEEP SCHEMATIC 89014731-4 SHEET 1 OF 4 VOLTAGE REF DIODE V511
LV MODULE Y SW & DRIVER SCHEMATIC 89014711-4 SHEET 2 OF 4 RO RELAY K3000
X MODULE MAIN SWEEP SCHEMATIC 89014731-4 SHEET 1 OF 4 LOCKOUT MV V508
SYNC AMPLIFIER SCHEMATIC 89014741-4 SHEET 2 OF 8
INPUT SELECTOR SWITCH
FOR Y PLUG-IN SINGLE TRACE
J9000-4 IS GND P9000-5 IS +110V
Y PLUG-IN DUAL TRACE, CONN AND RO SCHEMATIC
MAIN SWEEP
READOUT WITH MAIN SWEEP
X AMPLIFIER
MAIN SWEEP AND DELAYING SWEEP
DELAYING SWEEP
INDEPENDENT DISPLAYS
SCALE LAMPS
PILOT LAMP
6.3V AC
NOTES:
1 - RESISTANCE VALUES ARE IN OHMS, K-THOUSANDS, M= MILLION.
2 - CAPACITANCE VALUES ARE IN μμf UNLESS OTHERWISE SPECIFIED.
3 - ROTARY SWITCHES ARE SHOWN FULLY COUNTERCLOCKWISE; ARROW INDICATES CLOCKWISE ROTATION.

Figure 3-14. SCHEMATIC, DISPLAY LOGIC SWITCH AND SCALE LAMPS; MAIN FRAME MODULE DU MONT TYPE 425 OSCILLOSCOPE

(Reference Drawing 8901 4741-4, Sheet 4 of 8)

WAVEFORMS
(Taken With Controls Set As Follows:)

MAIN FRAME

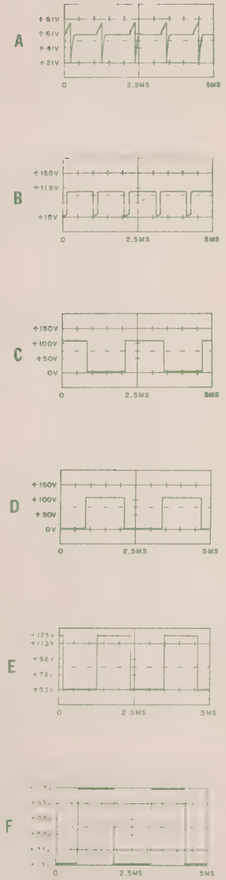
Control	Setting
Digital Read Out	999
Index Positioning	Center dot
Pattern Positioning	Center display with base line on center line
Polarity	+
Trigger Source	+ Int
Trig Level	Preset
Trig/Rec	Preset
Trigger Mode	Armed AC
Sweep Rate	1 Ms/Cm
Switch Mode	Alternate (out)
Display Logic	RO

DUAL TRACE

Control	Setting
Input Selector	Channel A
Volts/Cm	Cal
AC/DC	DC
Polarity	Normal
Read Out	Normal

DELAYING SWEEP

Control	Setting
Trigger Mode	AC
Trig/Rec	Preset
Trig Level	Preset
Trigger Source	+ Line
Pick-Off Source	Del Swp
Delay Zero	Fully cw
Sweep Rate	5 Ms/Cm
Length and Delay Multiplier	Adjust these controls to agree with waveform



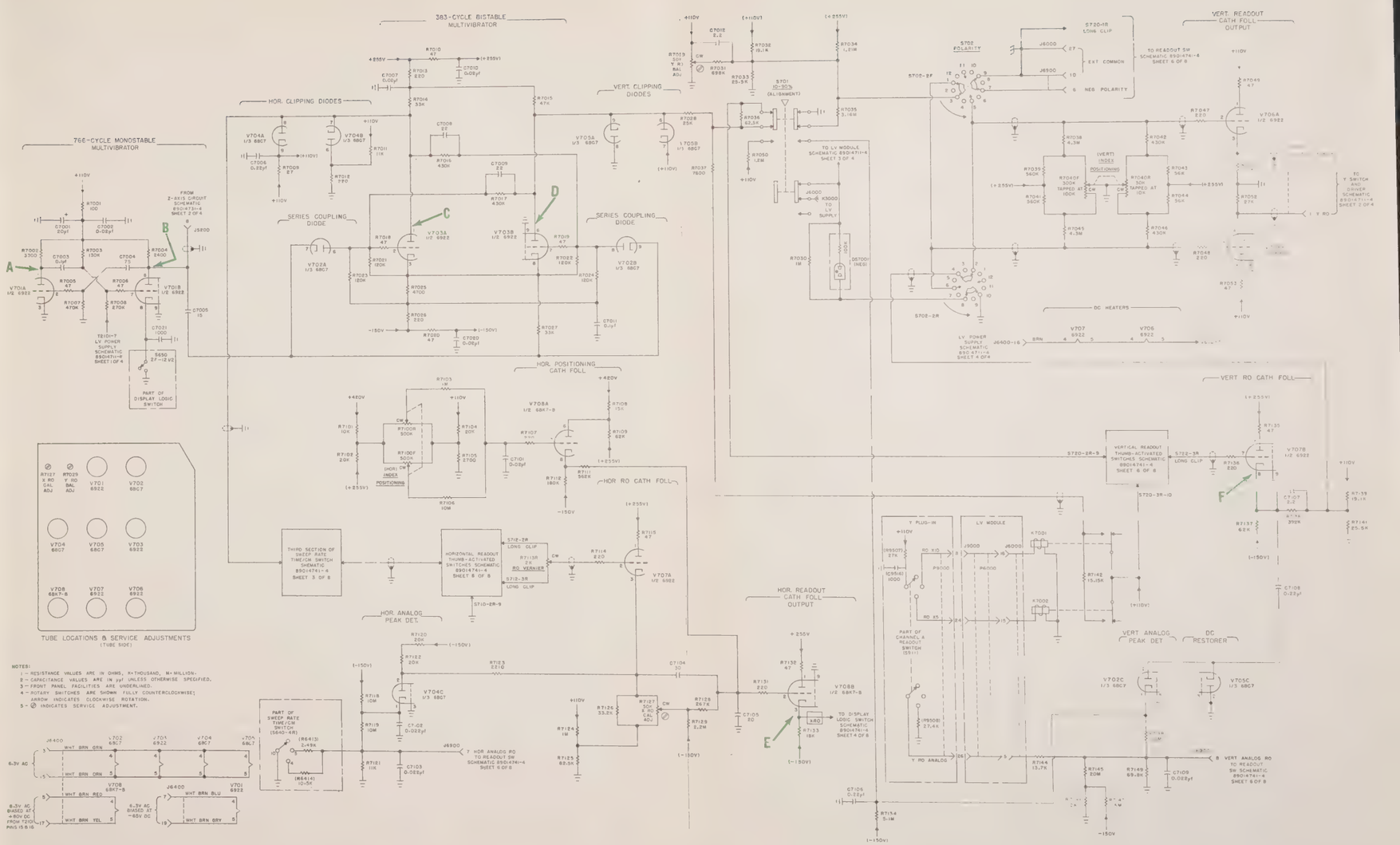

383-CYCLE BISTABLE MULTIVIBRATOR
766-CYCLE MONOSTABLE MULTIVIBRATOR
HOR. CLIPPING DIODES
VERT. CLIPPING DIODES
SERIES COUPLING DIODE
SERIES COUPLING DIODE
HOR. POSITIONING CATH FOLL
HOR RO CATH FOLL
HOR. READOUT CATH FOLL OUTPUT
VERT. READOUT CATH FOLL OUTPUT
VERT RO CATH FOLL
HOR ANALOG PEAK DET
VERT ANALOG PEAK DET
DC RESTORER
DC HEATERS
TUBE LOCATIONS & SERVICE ADJUSTMENTS
(TUBE SIDE)
NOTES:
1 - RESISTANCE VALUES ARE IN OHMS, K=THOUSAND, M=MILLION.
2 - CAPACITANCE VALUES ARE IN μμf UNLESS OTHERWISE SPECIFIED.
3 - FRONT PANEL FACILITIES ARE UNDERLINED.
4 - ROTARY SWITCHES ARE SHOWN FULLY COUNTERCLOCKWISE; ARROW INDICATES CLOCKWISE ROTATION.
5 - ⊘ INDICATES SERVICE ADJUSTMENT.
6.3V AC
6.3V AC BIASED AT +60V DC FROM T2101 PINS 15 & 16
6.3V AC BIASED AT -65V DC
PART OF SWEEP RATE TIME/CM SWITCH (S640-4R)
TO LV MODULE, SCHEMATIC 8901471-4 SHEET 3 OF 4
TO READOUT SW SCHEMATIC 8901471-4 SHEET 6 OF 8
FROM Z-AXIS CIRCUIT SCHEMATIC 8901473-4 SHEET 2 OF 4
TO Y SWITCH AND DRIVER SCHEMATIC 8901471-4 SHEET 2 OF 4
TO HOR ANALOG RO TO READOUT SW SCHEMATIC 8901471-4 SHEET 6 OF 8
TO VERT ANALOG RO TO READOUT SW SCHEMATIC 8901471-4 SHEET 6 OF 8
TO DISPLAY LOGIC SCHEMATIC 8901471-4 SHEET 4 OF 8
LV POWER SUPPLY SCHEMATIC 8901471-4 SHEET 4 OF 4
THIRD SECTION OF SWEEP RATE TIME/CM SWITCH SCHEMATIC 8901474-4 SHEET 3 OF 8
HORIZONTAL READOUT THUMB-ACTIVATED SWITCHES SCHEMATIC 8901474-4 SHEET 5 OF 8
VERTICAL READOUT THUMB-ACTIVATED SWITCHES SCHEMATIC 8901474-4 SHEET 6 OF 8
PART OF CHANNEL A READOUT SWITCH (S911)
PART OF DISPLAY LOGIC SWITCH
TEKTRONIX LV POWER SUPPLY SCHEMATIC 8901471-4 SHEET 4 OF 4
INDEX POSITIONING
PATTERN POSITIONING
EXT COMMON
NEG POLARITY
LONG CLIP
RO VERNIER
RO CAL ADJ
RO X5
Y RO ANALOG
Y PLUG-IN
LV MODULE

Figure 3-15. SCHEMATIC, READOUT GENERATOR; MAIN FRAME MODULE
DU MONT TYPE 425 OSCILLOSCOPE
(Reference Drawing 8901 4741-4, Sheet 5 of 8)

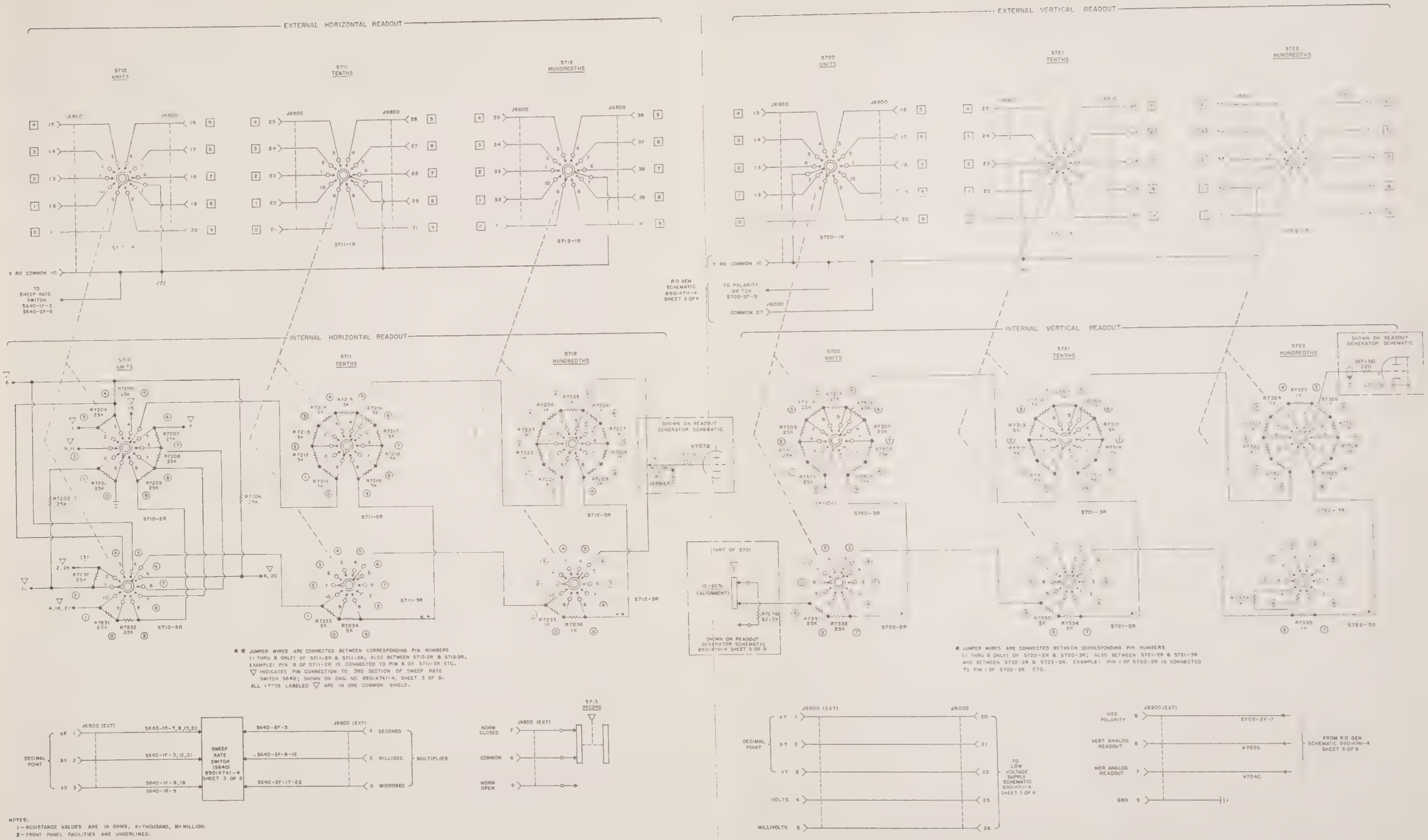


Figure 3-16. SCHEMATIC, HORIZONTAL AND VERTICAL READOUT SWITCHES; MAIN FRAME MODULE DU MONT TYPE 425 OSCILLOSCOPE

(Reference Drawing 8901 4741-4, Sheet 6 of 8)

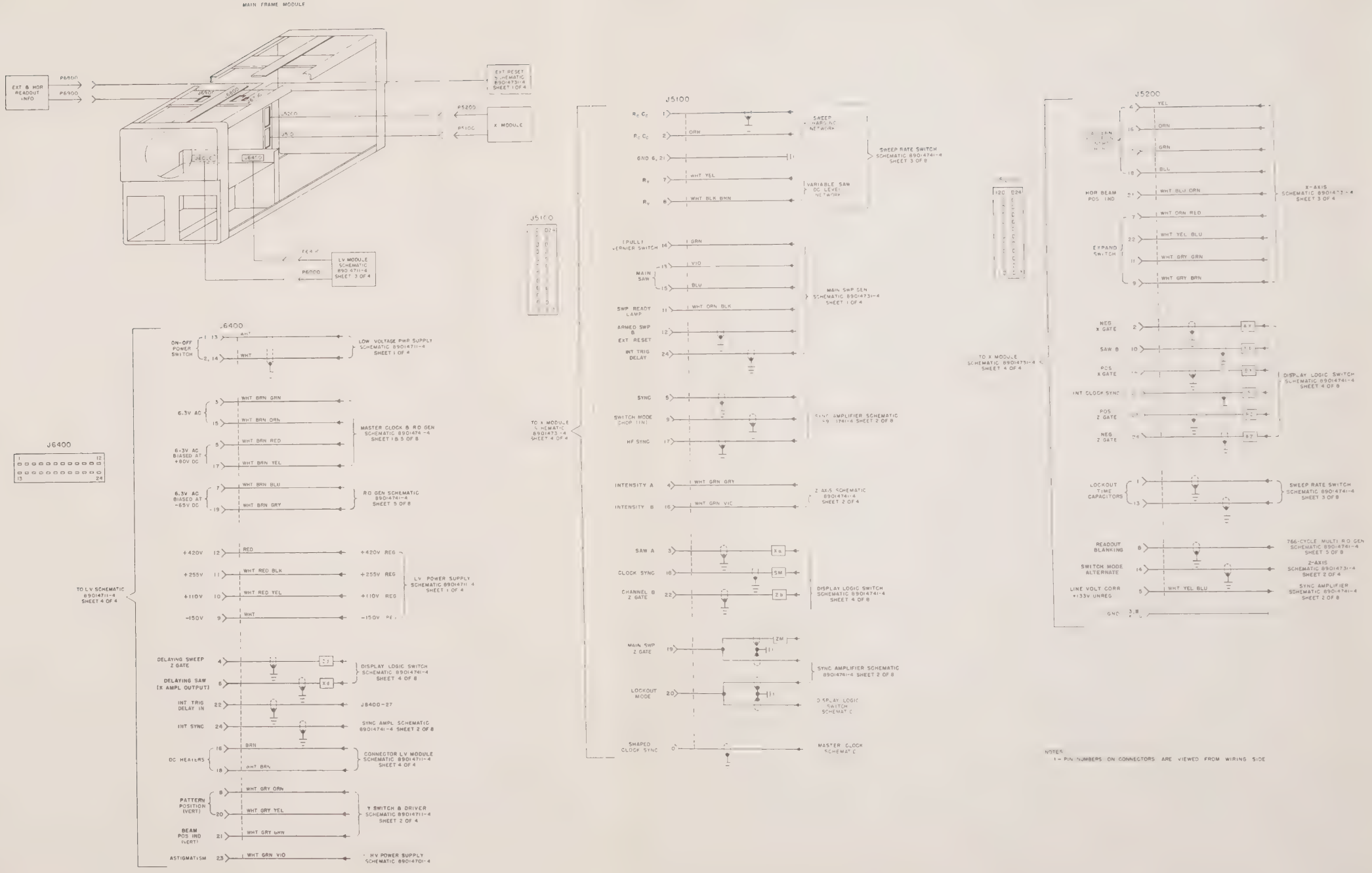

MAIN FRAME MODULE
EXT & HOR READOUT INFO
P6800
P6900
J6400
J6500
J6600
J6700
J5200
J5100
P5200
P5100
X MODULE
EXT RESET SCHEMATIC 8901473I-4 SHEET 1 OF 4
LV MODULE SCHEMATIC 8901471I-4 SHEET 3 OF 4
P6000
J6400
ON-OFF POWER SWITCH
LOW VOLTAGE PWR SUPPLY SCHEMATIC 8901471I-4 SHEET 1 OF 4
6.3V AC
6.3V AC BIASED AT +80V DC
6.3V AC BIASED AT -65V DC
MASTER CLOCK & RO GEN SCHEMATIC 8901474I-4 SHEET 1 & 5 OF 8
RO GEN SCHEMATIC 8901474I-4 SHEET 5 OF 8
TO LV SCHEMATIC 8901471I-4 SHEET 4 OF 4
+420V
+255V
+110V
-150V
LV POWER SUPPLY SCHEMATIC 8901471I-4 SHEET 1 OF 4
DELAYING SWEEP Z GATE
DELAYING SAW (X AMPL OUTPUT)
DISPLAY LOGIC SWITCH SCHEMATIC 8901474I-4 SHEET 4 OF 8
INT TRIG DELAY IN
J8400-27
INT SYNC
SYNC AMPL SCHEMATIC 8901474I-4 SHEET 2 OF 8
DC HEATERS
CONNECTOR LV MODULE SCHEMATIC 8901471I-4 SHEET 4 OF 4
PATTERN POSITION (VERT)
BEAM POS IND (VERT)
Y SWITCH & DRIVER SCHEMATIC 8901471I-4 SHEET 2 OF 4
ASTIGMATISM
HV POWER SUPPLY SCHEMATIC 8901470I-4
TO X MODULE SCHEMATIC 8901473I-4 SHEET 4 OF 4
SWEEP RATE SWITCH SCHEMATIC 8901474I-4 SHEET 3 OF 8
VARIABLE SAW DC LEVEL NETWORK
MAIN SWP GEN SCHEMATIC 8901473I-4 SHEET 1 OF 4
SYNC AMPLIFIER SCHEMATIC 8901474I-4 SHEET 2 OF 8
Z AXIS SCHEMATIC 8901474I-4 SHEET 2 OF 4
MAIN SWP Z GATE
LOCKOUT MODE
SHAPED CLOCK SYNC
MASTER CLOCK SCHEMATIC
J5200
X-AXIS SCHEMATIC 8901473I-4 SHEET 3 OF 4
DISPLAY LOGIC SWITCH SCHEMATIC 8901474I-4 SHEET 4 OF 8
LOCKOUT TIME CAPACITORS
766-CYCLE MULTI RO GEN SCHEMATIC 8901474I-4 SHEET 5 OF 8
Z-AXIS SCHEMATIC 8901473I-4 SHEET 2 OF 4
LINE VOLT CORR +133V UNREG
NOTES
1 - PIN NUMBERS ON CONNECTORS ARE VIEWED FROM WIRING SIDE

Figure 3-17. SCHEMATIC, CONNECTORS; MAIN FRAME MODULE DU MONT TYPE 425 OSCILLOSCOPE

(Reference Drawing 8901 4741-4, Sheet 7 of 8)

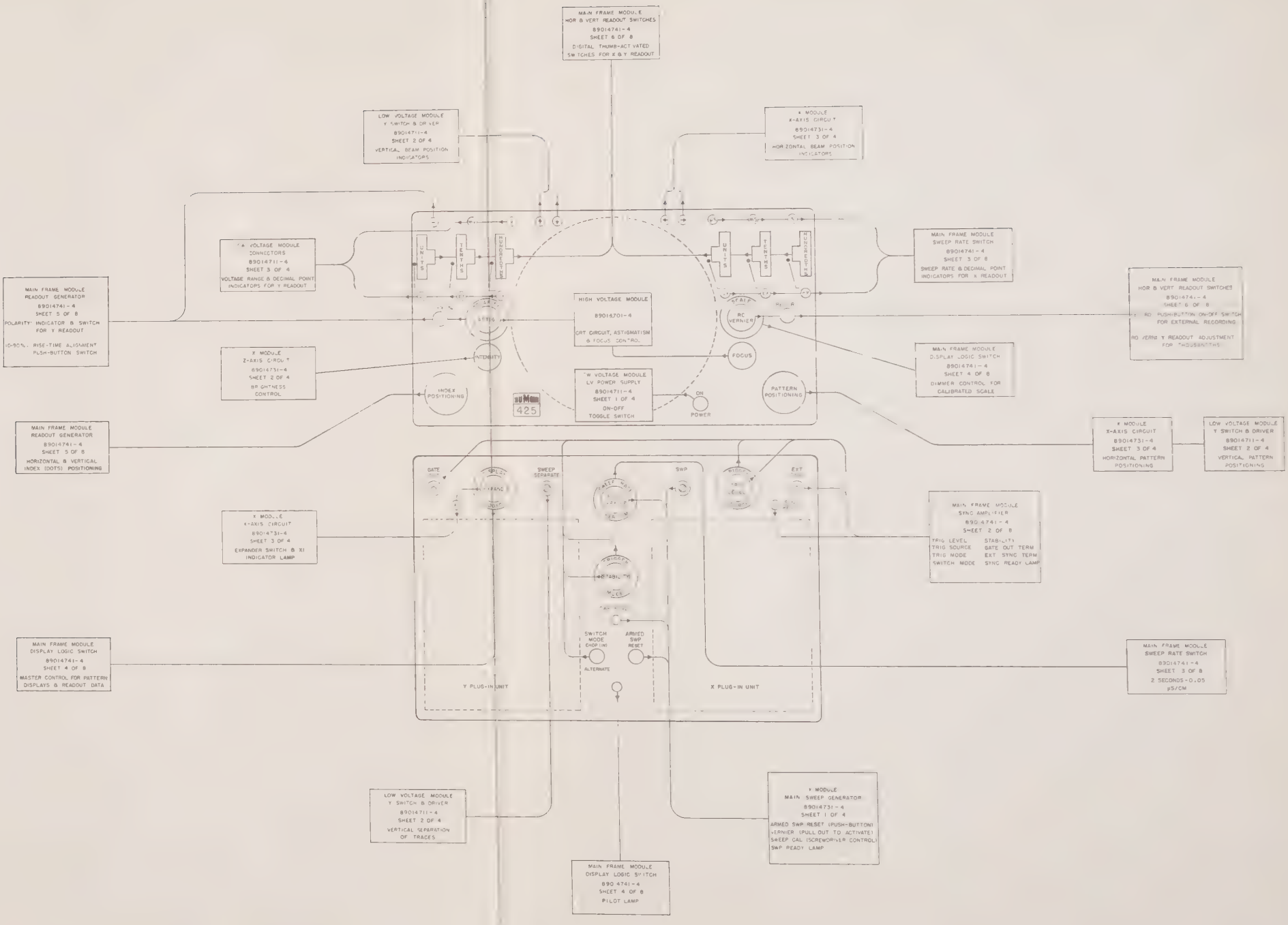


Figure 3-18. SCHEMATIC, FRONT PANEL; MAIN FRAME MODULE DU MONT TYPE 425 OSCILLOSCOPE
(Reference Drawing 8901 4741-4, Sheet 8 of 8)

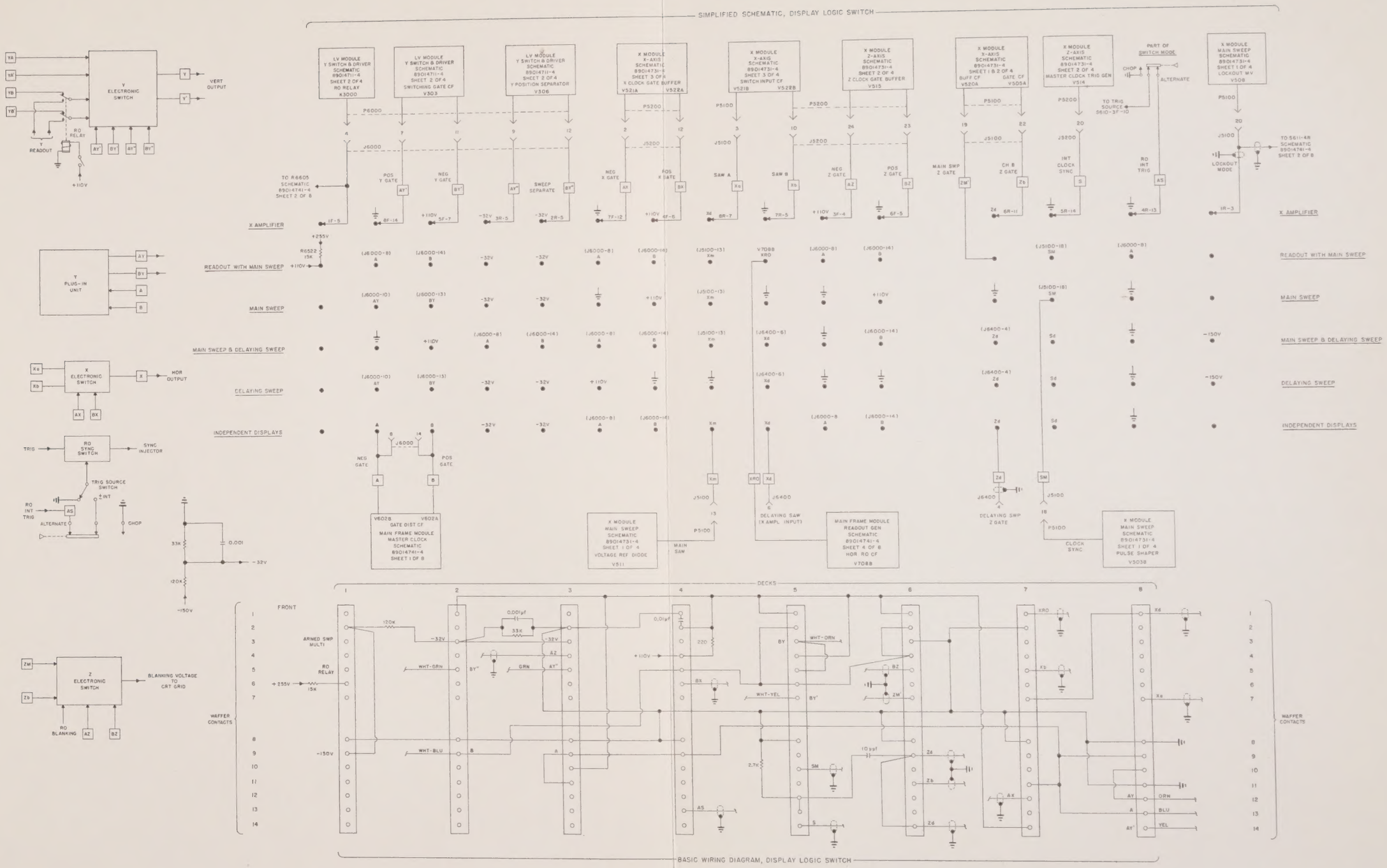

SIMPLIFIED SCHEMATIC, DISPLAY LOGIC SWITCH
Y ELECTRONIC SWITCH
VERT OUTPUT
Y READOUT
RO RELAY
+110V
LV MODULE Y SWITCH & DRIVER SCHEMATIC 8901471-4 SHEET 2 OF 4 RO RELAY K3000
LV MODULE Y SWITCH & DRIVER SCHEMATIC 8901471-4 SHEET 2 OF 4 SWITCHING GATE CF V303
LV MODULE Y SWITCH & DRIVER SCHEMATIC 8901471-4 SHEET 2 OF 4 Y POSITION SEPARATOR V306
X MODULE X-AXIS SCHEMATIC 8901473-4 SHEET 3 OF 4 X CLOCK GATE BUFFER V521A V522A
X MODULE X-AXIS SCHEMATIC 8901473-4 SHEET 3 OF 4 SWITCH INPUT CF V521B V522B
X MODULE Z-AXIS SCHEMATIC 8901473-4 SHEET 2 OF 4 Z CLOCK GATE BUFFER V515
X MODULE X-AXIS SCHEMATIC 8901473-4 SHEET 1 & 2 OF 4 BUFF CF V520A GATE CF V505A
X MODULE Z-AXIS SCHEMATIC 8901473-4 SHEET 2 OF 4 MASTER CLOCK TRIG GEN V514
PART OF SWITCH MODE
X MODULE MAIN SWEEP SCHEMATIC 8901473-4 SHEET 1 OF 4 LOCKOUT MV V508
P6000
P5200
P5100
J6000
J5200
J5100
TO R6605 SCHEMATIC 8901474-4 SHEET 2 OF 8
POS Y GATE
NEG Y GATE
SWEEP SEPARATE
NEG X GATE
POS X GATE
SAW A
SAW B
NEG Z GATE
POS Z GATE
MAIN SWP Z GATE
CH B Z GATE
INT CLOCK SYNC
RO INT TRIG
CHOP
ALTERNATE
TO TRIG SOURCE 5610-3F-10
LOCKOUT MODE
TO 5611-4R SCHEMATIC 8901474-4 SHEET 2 OF 8
X AMPLIFIER
READOUT WITH MAIN SWEEP
MAIN SWEEP
MAIN SWEEP & DELAYING SWEEP
DELAYING SWEEP
INDEPENDENT DISPLAYS
Y PLUG-IN UNIT
X ELECTRONIC SWITCH
HOR OUTPUT
RO SYNC SWITCH
SYNC INJECTOR
TRIG SOURCE SWITCH
RO INT TRIG
ALTERNATE
CHOP
GATE DIST CF V602A V602B
MAIN FRAME MODULE MASTER CLOCK SCHEMATIC 8901474-4 SHEET 1 OF 8
X MODULE MAIN SWEEP SCHEMATIC 8901473-4 SHEET 1 OF 4 VOLTAGE REF DIODE V511
MAIN SAW
MAIN FRAME MODULE READOUT GEN SCHEMATIC 8901474-4 SHEET 4 OF 8 HOR RO CF V708B
DELAYING SAW (X AMPL INPUT)
DELAYING SWP Z GATE
CLOCK SYNC
X MODULE MAIN SWEEP SCHEMATIC 8901473-4 SHEET 1 OF 4 PULSE SHAPER V503B
Z ELECTRONIC SWITCH
BLANKING VOLTAGE TO CRT GRID
RO BLANKING
DECKS
FRONT
WAFFER CONTACTS
ARMED SWP MULTI
RO RELAY
WHT-GRN
GRN
WHT-BLU
WHT-YEL
WHT-ORN
BASIC WIRING DIAGRAM, DISPLAY LOGIC SWITCH

Figure 3-19. SIMPLIFIED WIRING DIAGRAM OF THE DISPLAY LOGIC SWITCH; MAIN FRAME MODULE DU MONT TYPE 425 OSCILLOSCOPE

(Reference Drawing 8901 4741-6, Sheet 1 of 1)